A M E R I C A N

D Y E S T U F F R E P O R T E R

INSTITUTE OF TEXTILE
LIBRARY
TECHNOLOGY

VOLUME 43

1954

NORMAN A. JOHNSON
Editor

CHARLES A. WHITEHEAD
Managing Editor

MYRON D. REESER
Business Manager

HERBERT A. STAUDERMAN
Advertising Manager

JAMES A. DOYLE
Promotion Manager

FRANK R. MURPHY
Production Manager

LILLIAN M. THOMPSON
Circulation Manager

OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

American Dyestuff Reporter was founded in 1917 and the Textile Colorist and Converter (formerly Textile Colorist) was incorporated with it in January, 1949. Published every other Monday by the HOWES PUBLISHING COMPANY, INC., 44 E. 23rd Street, New York 10, N. Y. C. R. Howes, President; Ernest J. Finan, Executive Vice-President; Norman A. Johnson, Vice-President & Treasurer; Myron D. Reeser, Vice-President; C. Essenbreis, Secretary.

Telephone SPring 7-9364

AMERICAN
DYESTUFF REPORTER

Devoted to Textile Chemistry
BLEACHING • DYEING • PRINTING • FINISHING

Contents

VOLUME 43 JANUARY 4, 1954 NUMBER 1

• ***Departments***

Patent Digest 17
Paul Wengraf
Abstracts 19
News 24

• ***Proceedings of the American Association of Textile Chemists and Colorists***

Employment Register P1
Membership Cards P1
Calendar P1
Notice to Secretaries and Publicity Chairmen of Local Sections P1
Membership Applications P1
AATCC Research Newsletter No. 7..... P2
Meeting Report—Technical Committee on Research P3
1953 Intersectional Contest:—
The Effect of Urea-Formaldehyde Resins on the Light Fastness of Direct Dyes..... P6
Rhode Island Section
Report of Annual Meeting—Rhode Island Section.....P15
Report of Annual Meeting—NNE Section.....P16
Meeting Report—WNE Section P16
Meeting Report—Philadelphia Section P16
Meeting Report—NBITT Student Chapter P16

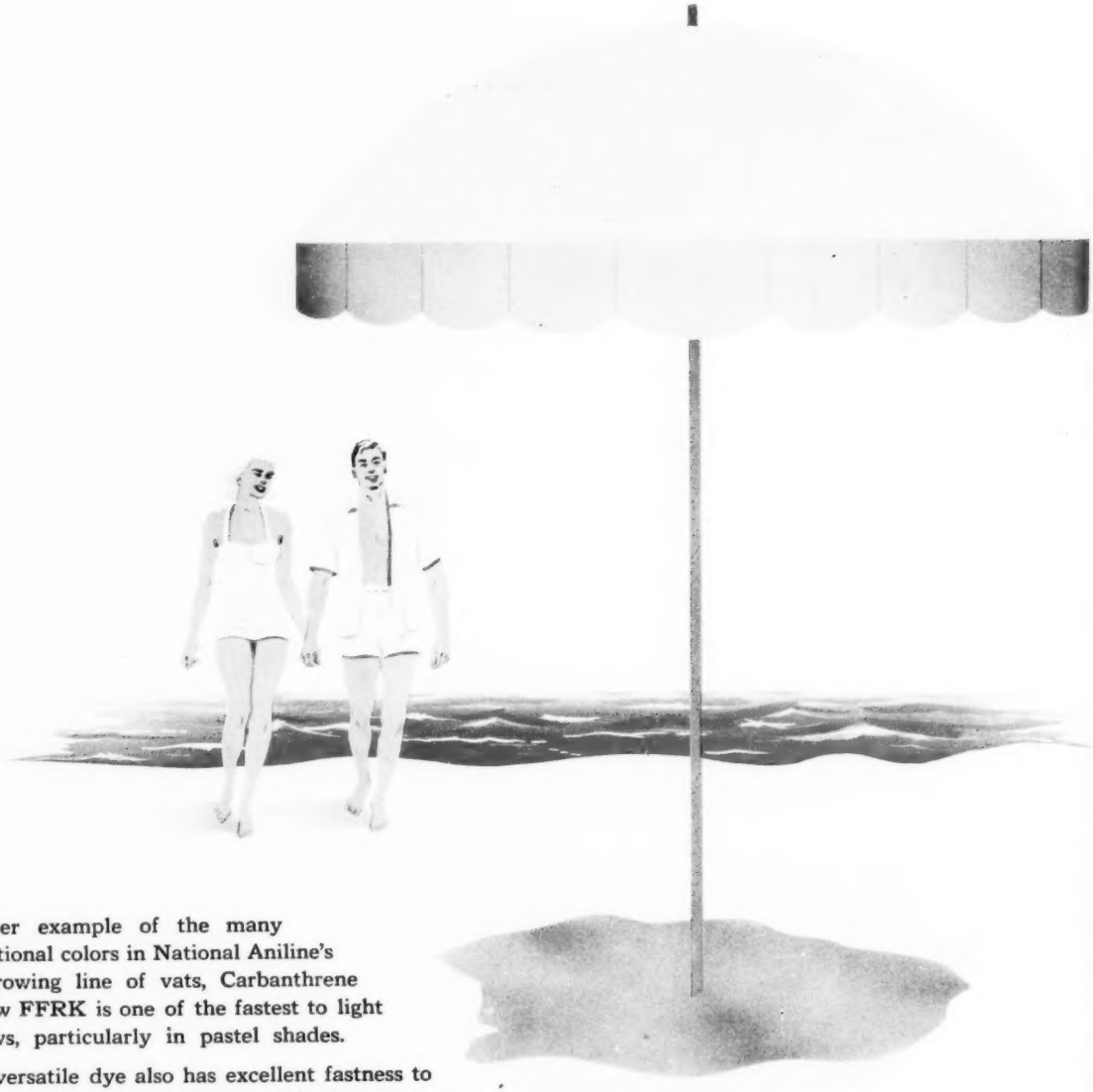
Copyright, 1954, Howes Publishing Co, Inc

Contents of previous issues can be found by consulting the Industrial Arts Index and the Engineering Index, Inc, at your library

exceptional in pastels

for sun, surf and sports wear

NATIONAL CARBANTHRENE YELLOW FFRK PAST



Another example of the many exceptional colors in National Aniline's fast-growing line of vats, Carbanthrene Yellow **FFRK** is one of the fastest to light yellows, particularly in pastel shades.

This versatile dye also has excellent fastness to washing, boiling, soap, fulling, perspiration, water, seawater, peroxide and chlorine, bleaching and stoving. It is, therefore, applicable to all types of cotton and viscose dyeing and especially to yarns that are subsequently to be mercerized, cross-dyed, or bleached. Naturally, it is excellent for beach and sports wear.

Phone our nearest office for working samples of Carbanthrene Yellow **FFRK**, for technical help on any difficult dyeing problem or for prompt delivery on your routine dyestuffs needs from warehouse stocks.

NATIONAL ANILINE DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR STREET, NEW YORK 6, N. Y.

Boston Providence Philadelphia Chicago San Francisco
Portland, Ore. Greensboro Charlotte Richmond Atlanta
Columbus, Ga. New Orleans Chattanooga Toronto

Allied Chemical

Proceedings of the

American Association of Textile Chemists and Colorists

Copyright, 1954, American Association of Textile Chemists and Colorists

Editor of Proceedings: Carl Z Draves, 30 Lahey St, New Hyde Park, N Y

JANUARY 4, 1954

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

53-34

Education: chemistry & dyeing, R I School of Design.

Experience: overseer of dyeing, cotton, rayon and blends.

Age: 46; married; references; position as piece dyer in northeastern U S desired.

1-4, 1-21

53-35

Education: textile school, evening classes.

Experience: textile mill chemist, woolen and worsted.

Age: 56; married; references; mill being closed, would like position in eastern U S.

1-4, 1-21

53-36

Education: Ph D, organic chemistry; training in textile microscopy.

Experience: research chemist, dyestuff application.

Age: 63; woman; unmarried; references; New York or New England preferred.

1-4, 1-21

53-37

Education: B S, textile chemistry.

Experience: textile stylist and sales.

Age: 28; married; references; position as textile technician or stylist or in converting desired, New York area.

1-4, 1-21

53-38

Education: college courses in chemistry, dyeing and production management.

Experience: dyehouse laboratory.

Age: 24; single; references; work in dyeing and finishing desired; east coast preferred but not essential.

1-4, 1-21

Membership Cards

Membership cards have now been mailed to all members who have paid their dues. Any member not receiving his card within two weeks of payment should notify the Secretary.

CALENDAR

COUNCIL
1954—Jan 22 (New York), Apr 30 (Atlantic City), June 15, Sept 15, Nov 19.
1955—Jan 21, Apr 15, June 17

NATIONAL CONVENTIONS
Sept 15-18, 1954 (Atlanta Biltmore, Atlanta, Ga); Sept 21-23, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J).

HUDSON-MOHAWK SECTION
Jan 22 (Albany); March 5; April 9, May 14 (Albany); June 18 (Outing).

MID-WEST SECTION
February 13 (Hotel Bismarck, Chicago, Ill).

NEW YORK SECTION
Jan 29, Feb 26 (Hotel Statler, N Y); April 23, May 21 (Swiss Chalet).

NORTHERN NEW ENGLAND SECTION
Feb 12 (MIT Faculty Club, Cambridge, Mass); Apr 9 (Lowell Tech, Lowell, Mass); June 11 (Outing—Merrimack Valley C C, Methuen, Mass); Oct 8 (Colonial C C, Lynnfield, Mass); Dec 10 (Woodland Golf Club, Auburndale, Mass).

PACIFIC SOUTHWEST SECTION
Jan 29.

PIEDMONT SECTION
Jan 30 (Hotel Poinsette, Greenville, S C); Apr 10 (Hotel Roanoke, Roanoke, Va); June 11-12 (Outing, Mayview Manor, Blowing Rock, N C); Sept 11 (Hotel Barringer, Charlotte, N C).

PHILADELPHIA SECTION
Jan 15.

RHODE ISLAND SECTION
Jan 28 (Providence Engineering Society, Providence, R I); Feb 25 (Johnson's Hummocks Grill, Providence); Mar 25 (Prov Eng Soc); Apr 29 Wannamoisett Country Club, Rumford, R I); June 11 (Outing—Wannamoisett C C); Oct 14 (Johnson's); Dec 2 (Annual Meeting—Sheraton Biltmore, Providence, R I).

SOUTHEASTERN SECTION
Jan 16 (Hotel Purefoy, Talladega, Ala); Mar 27 (Ralston Hotel, Columbus, Ga); May 14-15 (Outing—Radium Springs, Ga); Dec 11 (Atlanta-Biltmore, Atlanta, Ga).

NOTICE TO SECRETARIES AND PUBLICITY CHAIRMEN OF LOCAL SECTIONS

Papers presented before local sections should be sent to Dr Carl Z Draves Editor of the *Proceedings,* 30 Lahey Street, New Hyde Park, New York. Authors should provide two copies for this purpose.

Reports of local section meetings should be sent to the American Dyestuff Reporter with copies going to Dr H C Chapin, National Secretary.

Dates of meetings and advance notices of meetings should be sent to the American Dyestuff Reporter with copies also going to Dr Chapin. For publication in any particular issue, information should be in the office of the Reporter 17 days before the issuance date.

Membership Applications

December 4, 1953

SENIOR

Manson C Carpenter—Section head, Textile Section, Coatings Tech Serv, Dow Chemical Company, Midland, Mich. Sponsors: F L Jankens, E D Serdynsky.

Jorge E Flesch—Manager, Du Pont Dyestuffs Distributors, Cia Tecnica y Mercantil de Guadalajara, S A, Guadalajara, Mexico. Sponsors: J H Bailey, C J Laughlin.

Gerald Flexner—Executive, Flex Dyeing Co, Inc, New York, N Y. Sponsors: A J Rooney, R Ferris.

Benjamin F Henderson—Asst dyer, G J Littlewood & Son, Inc, Philadelphia, Pa. Sponsors: W D Humphreys, G J Littlewood.

Arthur C Holdsworth, Jr—Technical sales, Stein Hall & Co, Inc, Providence, R I. Sponsors: R H Lewis, J A Fraser.

Hoyle P Koontz—Foreman shift dyer, N C Finishing Company, Salisbury, N C. Sponsors: L C Greene, E E House.

Link M Lotter—Research chemist, Arkansas Company, Inc, Newark, N J. Sponsors: A A Cook, E B Whitworth.

Sanford Schwartzman — President, salesman, World Chemical Sales Co, Inc, Delawanna, N J. Sponsors: A Rotcap, S S Horowitz.

Paul A Studer—Research chemist, Celanese Corp of America, Summit, N J. Sponsors: F Fortess, C E Kip.

A Harold Zayotte, Jr — Sales engineer, Riggs & Lombard, Inc, Lowell, Mass. Sponsors: R B Stehle, T H Hart.

JUNIOR

John E Hall—Lab tech, Capital Piece Dye Works, Garnerville, N Y. Sponsors: F E Hall, J Niewaroski.

Alderic R Therrien—Lab technician, Arnold Hoffman & Co, Inc, Providence, R I. Sponsors: M Crowther, B J Garceau.

ASSOCIATE

George T Cartier—Textile chemical sales, Quaker Chemical Products Corp, Conshohocken, Pa.

Vernon E Moore — Sales representative, Becco Sales Corp, Buffalo, N Y.

(Concluded on page P14)

*AATCC Research Newsletter No. 8

NEWS IN GENERAL

May 4th has been set as the tentative date of an all day AATCC Research Symposium. Details of the program have not yet crystallized but its central theme will be the gearing of test methods research to the modern uses of test methods with particular emphasis upon their relationship to end use.

The subjects very likely to be included are: flammability, abrasion, laundering, drycleaning and other end use conditions. In addition, a major address will be heard at the luncheon session. The Hotel Statler has been named as the probable site of this most important Spring event.

The members of the general committee in charge are:

Robert C Allison	P J Fynn	Edmund A Leonard
Matthew J Babey	Weldon G Helmus	Leonard S Little
Kenneth H Barnard	George H Hotte	Lawrence S Thompson
George L Baxter	Glenn D Jackson	Harold W Stiegler
J Robert Bonnar	Albert E Johnson	Charles A Sylvester
Charles W Dorn	Norman A Johnson	

AT RESEARCH HEADQUARTERS

The staff has been serving in an advisory capacity to the textile industry and other groups interested in the AATCC Flammability of Clothing Textiles Standard Method #33-52, which is the method of test embodied in the Commercial Standard 191-53. Inquiries are being received concerning various technical aspects associated with carrying out the flammability test and the drycleaning or laundering procedures specified in the test method.

The development of an alternate, rapid test method for the Dynamic Absorption Test #70-52 looks very promising. This alternate method makes use of the Launder-Ometer Metal Tubes. Test conditions, such as time, temperature and speed of rotation, are almost identical with those of the regular method. Economy is effected in the amount of specimen, blotting paper, and distilled water needed. This new method is not intended as a replacement for the established method.

Further evidence has been accumulated to show that the Accelerotor has interesting possibilities for detergency studies. Soil removal is accomplished in extremely short time as compared with commonly used methods.

COMMITTEE ACTIVITIES

Doctor Stiegler has mailed notices to the effect that the 178th meeting of the Technical Committee on Research will be held at a new location in New York City -- the Plaza Hotel. Conflicts with other groups at the hotels customarily used for these meetings in recent years forced the change. The date of the meeting is Friday, January 22nd at 1:30 PM.

Fewer research committees will hold regular meetings at that time but the TCR session will be most important because of the major report to be made on recent AATCC investigations of the new clothing flammability law CS 191-53. AATCC research labs literally have worked night and day to obtain as quickly as possible the data needed to clarify inconsistencies and permit necessary modifications in procedure.

The need of this work became urgently apparent when fabric producers sought to have the required tests made in anticipation of the effective date of the law next June 30th.

CORRECTION: In the last Newsletter (No. 7), under "Committee Activities", your attention is called to two errors. It should be noted that Ernest R Kaswell, Fabric Research Laboratories (rather than Ernest L Caswell, Ciba Co, Inc) takes over the chairmanship of the Committee on Permanent Finishes from Alden D Nute, and that Matthew J Babey takes over Robert C Allison's duties as chairman of the Committee on Standard Depth of Shade.

* Published every other issue of the AMERICAN DYESTUFF REPORTER.

Meeting Report——

ONE HUNDRED AND SEVENTY-SEVENTH MEETING OF THE TECHNICAL COMMITTEE ON RESEARCH

November 20, 1953
New York, N Y

THE 177th meeting of the Technical Committee on Research convened at 1:30 pm in the West Ballroom of the Hotel Commodore, New York, N Y, on Friday, November 20, 1953.

Charles W Dorn, TCR Chairman, reported the following changes in chairmen of subcommittees, effective January 1, 1954:

Dimensional Stability———H C Donaldson, Jr replaces John Warner

Wash Fastness———P J Fynn replaces C A Sylvester

Durable Finishes———E R Kaswell replaces A Nute

Snag Resistance———J E Smith replaces C Bacon

Light Fastness———R C Allison replaces M Babey

Simplified Control Tests———E C Hansen replaces T G Hawley, Jr

Mr Dorn also reported that, due to pressure of other duties, J Robert Bonnar has had to relinquish chairmanship of AATCC's committee for establishing standard dyeings of military shades for the Quartermaster Corps and Air Force. W A Holst is the new chairman of this project. M J Babey heads the Subcommittee on Standard Depth of Shade.

It was explained that the plan to have one-day meetings covering activities of the Council, TCR and subcommittees has been found to be inoperable. Subcommittee meetings will occupy all day Thursday and Friday morning at the next meeting.

L S Little, Chairman of the Executive Committee on Research, reported on a recent meeting of officers and committee members at Lowell Technological Institute during which AATCC was assured of continued use of current and expanded facilities there. Mr Little further reported that proposals for international standards were being readied, in expectation of an ISO meeting in Scarborough, England in June. (AATCC's revised methods, in preparation for the conference, were published in the December 21st issue of the AMERICAN DYESTUFF REPORTER).

Pointing out that the cost of current research activities continues to exceed budget provisions, Mr Little urged that an increased corporate membership drive be stimulated.

H W Stiegler, director of research, reported on the activities of the staff at Lowell. He made special reference to work on flammability, including the evaluation of new instrument parts and the effect of dry-cleaning on flammability tests, and to the influence of moisture in drycleaning fluids on flocks and overprints. The staff has determined that moisture content has a definite influence on water repellency. Additional work is being conducted on the shrinkage project.

Referring to the grey scales, Dr Stiegler stated that both the English and Continental versions are available, and their sales may be pushed. They are available from Lowell.

Dr Stiegler then called upon subcommittee chairmen for their regular reports.

Dimensional Changes

J F Warner, Chairman, reported that, in the opinion of his committee, shrinkage as it applies to wool and wool blends is considered a completed project. Of late, his committee has been concerned with drawing up a voluminous report on the comparison of the CCC-T-191A cotton shrinkage test against CCC-T-191B. Comprehensive tests were involved in preparing this report on nine cotton and two stabilized rayon fabrics, the work being done in five different laboratories. This report is slated for publication in the AMERICAN DYESTUFF REPORTER in the near future. The subcommittee is now conducting further tests incorporating the results of this work with an evaluation of British and French proposed test methods, as well as home launderings and two typical commercial launderings, in order to have recommendations for the ISO meeting. Two new subcommittees have been set up to study existing shrinkage-test methods to determine whether they are adequate for

1) resin-treated cotton and rayon, and
2) fabrics composed wholly or in part of the relatively new acrylic, polyester, and polyamide types of synthetic fibers.

Dr Stiegler has made some favorable comments on this forthcoming report and has given due recognition to the assistance rendered this committee by the Lowell staff.

Snag Resistance

C A Baker, Chairman, reported that this committee had come to agreement on a number of proposed changes in the standard test method identified as 65-52. Inter-laboratory tests have resulted in the approval of the following:

1) a change from the present nonstandard sand paper to a paper to be secured from a single manufacturer, who has promised a uniform product.
2) a change in the weight used in the tensioning device from 175 to 50 grams. Experimental evidence indicates improved evaluation of finishes and lower deviations in repetitive tests, using the lower weight.
3) simplification in the counting. It is being recommended that only one count of snags be made after laundering.
4) guide rails are being added to the equipment to assure that the stocking travels a straight path during the test.

Upon regular motion the committee accepted these recommendations for circulation to the entire membership. It is hoped that this will lead to their approval as a tentative standard.

Desizing

E H Grosse, Chairman, reported that this committee is evaluating methods of measuring residual starch, investigating four different techniques of pad-steam desizing, and also evaluating techniques of pad jig or beck and pad bin methods of desizing.

Simplified Control Tests

T G Hawley, Chairman, reported that this committee has developed a rapid gas-fading test. Lowell and three other

laboratories are in agreement. The proposed test gives a result roughly equivalent to one cycle in the standard gas-fume chamber. Dr Hawley referred to the test as a sandwich technique. The bottom layer is a plate of glass on which is placed a piece of white cloth impregnated with sodium nitrite. The cloth is treated with a measured amount of phosphoric acid and then covered with a blotter. This is followed by the sample to be tested, and finally by a flat iron held in contact with the sample for two minutes.

Upon regular motion the committee agreed to accept this recommendation for circulation to the entire membership of the committee for approval as a tentative AATCC standard. The committee expects to do additional work to see whether this method is satisfactory to test samples after drycleaning, and also after washing. The committee is also planning the development of a rapid test to be the equivalent roughly to two and three cycles in the standard chamber. It is believed that this may be accomplished by increasing the concentration of sodium nitrite or the amount of phosphoric acid. Some work has been done with fabrics constructed of combination fibers but more needs to be done before the test can be considered final.

Mr Dorn advised the committee that an instrument requiring only two hours to evaluate gas-fume fading has been developed at Cliffside Dyeing Corporation, Paterson, N J. This piece of equipment was examined by a committee recently, and C A Sylvester was appointed to spend some time at Cliffside to compare the instrument with AATCC's standard chamber.

Mr Dorn referred to the reported fading of vat-dyed cottons in gas-fired tumble dryers when natural gas is used as a source of heat. This was reported from the Midwest about a year ago, but to the knowledge of those present, no other reports have come through since. Further information will be sought from the educational institution which first brought it up, and F T Simon will gather information from sources available to him and report at the next meeting.

Stoving

W A Holst, Chairman, reported for this new committee, which has been formed with the following as additional members: P L Oertel, *Secretary*, H Luttinghaus, and C H A Schmitt. Thus far preliminary work confirms the fact that the present standard test is not adequate. Work has been lined up designed towards the recommendation of a new standard test.

Antistatic Finishes

K H Barnard, Chairman, reported that this committee now has a method available. It is based on the electrical measurement of the resistivity of cloth. Sixteen samples of commercial fabrics were tested in ten laboratories, seven of which have completed their reports. Each of the laboratories used a different piece of apparatus but the agreement in results was excellent. Mr Barnard emphasized that resistivity is not the only factor involved in evaluating antistatic finishes, and announced that further work will be done on other aspects. Upon regular motion the committee voted to accept the proposed tentative method for circulation to the complete membership of the committee for approval.

Mr Little reported that there have been suggestions that interest in static and antistatic finishes would justify holding a symposium on the subject. He asked for opinions as to whether the subject would be sufficiently comprehensive or whether other subjects might be combined with it to make the meeting more valuable. Immediate suggestions for combining the subject with those of pilling, anticrease, and soiling occurred to some of the members. Mr Little requested that the members present their ideas on such a symposium at the January meeting.

Mr Little also referred to the perennial problem of sectional research committees, many of which have not been too active. In some instances they have been conducting work which leads to the preparation of an intersectional contest paper. He expresed a feeling that, since there are sufficient problems in conducting standard tests throughout the textile industry, it might pay to ask the sectional research committees to sponsor in their individual sections a program feature promoting general discussion of such problems. This would permit a free interchange of ideas, which should result in much less difficulty for those having such problems. It was requested that this item be put on the agenda for the next meeting, and that the members present their reactions at that time.

Fastness to Washing

C A Sylvester, Chairman, reported that this committee had completed a draft of the proposed wash tests for the ISO. They are essentially the same as those in the *Year Book* with certain minor changes to make them more acceptable to our European confreres. He also reported on an evaluation of the new grey scales. The committee has approved all of them for use and will use them in expressing their own results. Eight laboratories participated in the evaluation, and were in very good agreement as to results. For evaluating stain, some of the participants still prefer to use the AATCC color transference chart, but in the evaluation results were no more exact.

The committee has examined much data from work done on alternating light and wash tests, and thus far has found that the effect obtained by exposing a dyeing for 20 hours in a calibrated Fade-Ometer plus a III-A wash test is closely equivalent to 30 sun hours plus a III-A test, where the sun hours were between 9 am and 3 pm during August and September. The committee also found that five repetitive tests, consisting in each instance of five hours' calibrated Fade-Ometer exposure plus a #3 test, is equivalent to five repetitive tests, consisting in each instance of six hours' sunlight exposure plus a #3 test. Interlaboratory tests have now been planned to determine duplicability of results.

Stream Pollution

P Theel reported that the Bibliography on Stream Pollution is almost ready for publication and that his committee might get some help from an engineering group studying methods of handling textile waste. Reporting on the Philadelphia project, Professor Theel reported that he now has a man working one day plus three afternoons per week to complete the work on this project.

Bleaching

Chairman T E Bell was not present. Mr Little, who had seen a copy of Mr Bell's report, requested that Dr Stiegler prepare a summary of it and mail it to the members.

Durable Finishes

A D Nute, Chairman, reported that this committee has discussed two subjects for future work:

1) The measurement of the initial resiliency or resistance to creasing of a fabric.

2) The measurement of durability to laundering of deeply embossed cotton fabrics.

After careful consideration the first was chosen for future work.

Continuous Wool Scouring

E A Leonard, Chairman, was not present due to illness. Dr Stiegler read Mr Leonard's report, which indicated that there is still some further work to be done.

Chlorine Retention

L L Walmsley, Chairman, was not present, but H Y Jennings made a verbal report. He stated that the committee had revised the present test method and circulated it to each member of the subcommittee for final evaluation.

Standard Soils

In the absence of G Wiseman, Chairman, Dr Stiegler read a report submitted by him. The committee has decided to evaluate the following fibers to determine whether the same soil will react on them similarly: spun acetate, spun viscose, spun nylon, silk, spun Orlon 42, spun Dacron, Dynel, Acrilan (1953 fiber). Ten laboratories will participate. Tests will be run with soap, synthetic detergents and distilled water. It is expected that final results will be ready for discussion at the next meeting.

Water Absorbency

R B Smith, Chairman, reported that this newly organized committee held its first meeting on November 19. It will prepare a bibliography on this subject and distribute it to members for abstracting. It also plans to investigate present Quartermaster methods.

Fastness to Light

M J Babey, Chairman, advised of a probable revision in the present test method. The committee will recommend substituting a black panel thermometer for the mercury thermometer now specified. The black panel temperature will be set for 165-175° F and instructions for controlling the temperature will be drawn up. Upon regular motion it was agreed that this matter should be circulated to the complete membership of the committee for approval. The committee will now evaluate samples of synthetic fabrics which have been exposed around the country to both sunlight and daylight. Thus far there appears to be as much variation in the character of fading in sunlight as in the Fade-Ometer.

C A Seibert gave a complete report on the work which he did this past summer on the project to determine the conditions in the Fade-Ometer which will as nearly as possible duplicate sunlight fading. He also outlined tests which he is planning to run on his special Fade-Ometer.

Abrasion

M N Winkler, Chairman, was not present. R L Stutz and P J Fynn reported that laboratory studies are continuing. Thus far correlation is not too good. The committee plans to include work on the Accelerotor in its project.

Mr Little, at this point, commented that the Wash Fastness Committee is interested in Accelerotor data and that there is considerable interest in the industry. Dr Stiegler reported that, in this connection, 24 Accelerotors have been sold and are in use, and other people are interested in acquiring them. He referred to a recent meeting in New York with users of this instrument. An abrasive coated cloth has been made up to be used in the Accelerotor. This is prepared in rolls of five-yard lengths and has been found to be very convenient. Dr Stiegler stated that, new uses for the instrument are constantly being found.

Definitions

G H Hotte reported that this committee is working by correspondence. It is utilizing ASTM definitions, as well as definitions from the Society of Dyers and Colourists and the Textile Institute. He asked that chairmen of all subcommittees submit to him proposed definitions, as well as terms requiring definitions, for the consideration of his committee. Dr Stiegler stated that he will circularize all committee chairmen on this matter.

Fulling

Mrs Pardy was not present. Dr Stiegler reported that work is proceeding well.

Standard Depths

M J Babey, the new chairman, reported that this committee is at work and expects to have a formal report at the next meeting.

R H Souther, speaking from the floor, commented on shrinkage control in the Sanforizing operation. He stated that considerable work done at his laboratory compared the regular test with the results of commercial laundering and home laundering. Results agreed very well, if the cloth is dried in air, but poor agreement was found if the cloth is dried in automatic dryers. This would appear to be within the jurisdiction of the Committee on Dimensional Changes and would include a consideration of tumble drying, which has not thus far been done. It was generally agreed by those present that the whole question of tumble drying in relation to shrinkage should be investigated.

Color

I H Godlove left a report indicating that a question propounded by A W Etchells involving tolerances for center to selvage shades has been thoroughly discussed. It appears that Roland Derby, Jr has developed a method using the spectrophotometer to determine such tolerances, and that this method should be publicized He is now planning to circularize his committee on this proposed method.

Mr Babey, speaking from the floor, referred to the fact that one of the accepted tests is the lime spot test. He questioned whether this test has any value. There was considerable sentiment that, while this test might have been of importance historically, it does not appear to have current significance. Dr Stiegler was asked to circularize the membership of the committee to determine whether this should be dropped or retained as a standard method.

Mr Dorn reported that he had circulated to many of the committee chairmen the publication "Organization and Functions of AATCC Research Committees."

There was a question from the floor on AATCC's joint activities with ASTM. Dr Stiegler answered that there is a joint committee which meets every six months, and has done so for the past three years. At this meeting differences in tests are reconciled including the language in which they are expressed. The two organizations are in complete agreement on a large number of test methods. In some instances it is AATCC tests which have been accepted by ASTM, and in others, the reverse. It was expressed from the floor that, in addition to this activity, there might be much more joint subcommittee work. There seemed to be some question as to the value of formal joint subcommittees. In many instances there is now duplication of membership, although committees work separately. It appeared advisable to have a further discussion on these joint society committee relations and Dr Stiegler was asked to be ready at the January meeting to review the present status, and after each subsequent meeting, to make a report on the meeting.

The meeting adjourned at 4:20 pm.

Those present were:

C W Dorn, Chairman
H W Stieger, Director of Research
G H Schuler, Secretary
L S Little, Chairman, Executive Committee on Research

W D Appel
E O Appeltofft
E C Atwell
M J Babey
C A Baker
K H Barnard
J R Bonnar
D G Carmichael
H C Chapin
C Z Draves
P J Fynn
I H Godlove
E H Grosse
H E Hager
T G Hawley
A E Hirst
W A Holst, Jr
G H Hotte
R W Jacoby
H Y Jennings
A E Johnson
E W Lawrence
J E Meili
J E Norton
A D Nute
F J O'Neil
R E Rupp
B A Ryberg
C H A Schmitt
C A Seibert
F T Simon
R B Smith
R H Souther
R B Stehle
R L Stutz
C A Sylvester
A F Tesi
P Theel
J F Warner
M N Winkler
J A Woodruff
rl Young

First Prize Winner
1953 Intersectional Contest——

THE EFFECT OF UREA-FORMALDEHYDE RESINS ON THE LIGHT FASTNESS OF DIRECT DYES*

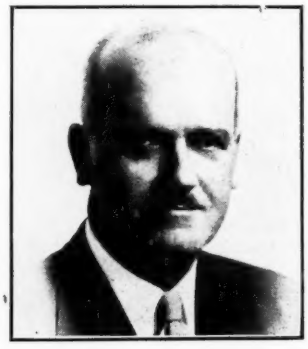
RHODE ISLAND SECTION

COMMITTEE
Kenneth J Broden, *Chairman*
Francis H Casey, *Co-chairman*
W George Parks, *Speaker*

Edward J Allard
Raymond K Andrew
William H Cady
Ernest J Chornyei
Edward C Collins
Alberic T DiMasi
Edward H Gamble
Bertram J Garceau
Thomas H Hardy
John E Hughes, Jr
Raymond W Jacoby
William J Jutras
Thorwald Larson
Edward W Lawrence
Arthur F McLean
Alden D Nute
George T Roberts
Charles A Robinson
William Stafford
Raymond B Taylorson
Robert G Thomas

K J Broden

F H Casey



W G Parks

This investigation was undertaken in an effort to determine the factor or factors which cause changes in the light fastness of direct dyes when dyeings are after-treated with urea-formaldehyde resins. It was believed that, if the cause or causes could be determined, it might be possible to overcome the effect.

The molecular structures of many direct dyes were studied. There were indications that, when certain groups in the molecule occupied particular positions, degradation of light fastness resulted after resin treatment. In many cases, however, no relationship could be found between the molecular structure of a dye and its behavior in light when resinated.

This study revealed that, by careful selection of catalyst and by controlling the molar ratio of urea to formaldehyde, the degrading effect of the resin on those dyes of which the light fastness is impaired should be materially modified.

INTRODUCTION

IT IS well known that, when cloth dyed with direct dyes is given a urea-formaldehyde resin finish, three different conditions arise as to the fastness to light of the finished fabrics, as follows:

1) Light fastness is improved
2) Light fastness is not affected
3) Light fastness is reduced

The reduction of light fastness with certain dyes is a serious feature, and the dye manufacturers are fully aware of this and have published tables showing the effect of urea-formaldehyde resin on their particular dyes; but, so far as we have been able to discover, no systematic attempt has been made up to the present by any research group to get at the cause of the trouble. In the Symposium on Photochemistry held in England as recently as September, 1949, one of the speakers *(1)* remarked, "It is not easy to give satisfactory explanations why Durazol Blue 2GNS and Solar Blue F should be satisfactory (in light fastness when resin-treated), whilst Durazol Blue GS and similar types are so heavily reduced in their resistance to light fading."

Attempts to correct this condition have so far been confined to a) using only dyes whose light fastness is either unaffected or improved by the resin treatment, or b) modifications of the treatment itself (e g, by using zinc chloride as catalyst

* Presented at the Conrad Hilton Hotel in Chicago on Saturday, Sept 19, 1953.

instead of the usual ammonium salts) *(2)* or by aftertreatment with sodium copper tartrate *(3)*. Neither of these examples can be considered a cure-all.

This study was undertaken in an effort to find the factor or factors causing the changes in light fastness. It was thought that, if either could be determined, it might be possible to overcome the deleterious effects or to enlarge upon the beneficial effects.

The factors studied were as follows:

I. The molecular structure of the dye.
II. Possibility of chemical reaction between the resin and the dye.
III. Possibility of breakdown of the resin under the influence of light, with the formation of a product that affects the dye.
IV. Molar ratio of urea to formaldehyde.
V. Curing catalyst.
VI. pH of the resin-finished fabric.

In addition to a study of the factors listed above, further investigations were made to determine the effect of light rays of different wave lengths on treated and untreated dyeings, on dye in solution, on a urea-formaldehyde film with and without dye on glass, and on dyed cellophane, untreated and urea-formaldehyde-treated.

The direct dyes selected for study appear in Table I.

The figures for light fastness given in Table I are from the literature of dye manufacturers. Comparison of the figures in the extreme right column for the number of Fade-Ometer hours to a break in light fastness *after* urea-formaldehyde aftertreatment with the figures in the third column from the right for the hours to a break *before* aftertreatment illustrates how some dyes are improved, some are unaffected, and some are impaired in light fastness by U-F aftertreatment on rayon.

RELATION OF DYE STRUCTURE TO RESIN EFFECT

An even longer list than that given in Table I was prepared, of direct dyestuffs classified as follows with respect to the effect of urea-formaldehyde aftertreatment on light fastness:

a) those improved
b) those not affected
c) those impaired.

Fifteen dyes fell into the first group, seven into the second, and twenty into the last. The molecular structures of these dyes were then studied in an effort to determine whether those in any one class had any characteristics in common.

Direct dyestuffs, which nearly always contain one or more azo groups resulting from coupling with mono- or dicyclic intermediates after diazotization of amino groups, are characterized by affinity for cotton arising generally from the presence of some central symmetrical structure of extended form, such as benzidine, tolidine, dianisidine, diphenylurea, stilbene, or 1:4 or 2:6 naphthalene, which permits hydrogen bonding between cellulose and active groups on the long dye molecule. Water solubility is primarily due to the presence of sulfonic groups. Hydroxyl and amino groups, and rarely carboxyl groups, sometimes permit improvement of fastness on the fiber or alteration of shade or both by various methods of aftertreatment. Substituted hydroxyl or amino groups are also often present in direct dyestuffs. [See Vickerstaff *(15)*].

Approximately one-half of the dyes studied were made from the diamines benzidine, tolidine, dianisidine, or o-dichlorobenzidine. These dyes all contained one or more sulfonic acid groups, and examination of their number and position did not indicate that these groups appreciably influenced change in light fastness on resinating. The direct blues from dianisidine have two to four sulfonic acid groups in different positions, as in CI 502, 512, 518, and 520, and the light fastness is improved in all cases on resinating.

Comparison of the light fastness of dyes made from benzidine, tolidine, and dianisidine, where the coupling agents were the same, did not indicate any difference in light fastness after resin treatment in most cases. For example, the direct blues CI 406, 477, and 520 are made from benzidine, tolidine, and dianisidine, respectively, and are coupled with H acid. The light fastness of all three dyes upon resin treatment advances from 7 hours to 20 hours of Fade-Ometer exposure for the first break. As tolidine contains methyl groups in the ortho position in the benzidine nucleus, and dianisidine, methoxy groups, these groups apparently have very little influence. However, when chlorine is substituted in the same positions on benzidine, there seems to be a marked difference. For example, Congo Red (CI 370), which shows a drop in light fastness from 10 hours to 1 hour when resinated, is based on benzidine, and Red 8B (CI 436), which shows a gain from 10 hours to 15 hours, is based on dichlorobenzidine. The coupling agents are somewhat different, it is true, but both dyes have amino groups on the naphthalene component adjacent to the diazo group, and, as will be shown, this type of dye is usually degraded in light fastness by conventional urea-formaldehyde resin treatment. Chlorine substitution on the benzidine might then have a stabilizing effect on the fastness to resinating.

In some cases the nature of the functional groups involved in the coupling seems to influence the fastness properties when a resin is applied. An example of this is found in Benzopurpurine 10B (CI 495) and Blue G (CI 502). These dyes have identical structures, except that the amino groups of CI 495 are replaced by hydroxyl groups in CI 502. Upon the application of resin the light fastness of CI 495 is practically destroyed, while that of CI 502 is materially improved.

CI 477 is improved in light fastness with resin treatment, as previously mentioned. Replacing the NH_2 groups of this dye with OH groups, as in CI 466, apparently lessens this improvement, for the latter dye is rated as having the same fastness before and after resinating.

If it is assumed that one possible effect of resins is reaction with or association with the OH and NH_2 groups, it is possible that the stability of azo (—N=N—) will be influenced on exposure to light. It is conceivable that, with two reactive groups such as OH and NH_2 attached to the same nucleus in close proximity, both groups may enter into association, and the product might stabilize the azo group. It is also conceivable that an NH_2 and an OH will produce more stability than two OH groups.

TABLE I

DIRECT DYES STUDIED

DYESTUFFS	C I or Pr No.	Dyeings %	FADE-OMETER HOURS 1st Break Rayon	1st Break Cotton	1st Break Rayon UF
Green BLL *(12)*	Pr 425	3.00	50	15	5
Red F Conc	419	1.15	35	10	2
Bordeaux B Ex	Pr 67	0.66	35	10	1
Violet N Conc	394	1.00	20	7	1
Green B Conc	593	1.20	20	5	10
Green 3B Conc	589	2.00	20	5	10
Brown M Conc	420	1.00	20	5	20
Blue 2GL	533	1.80	40	20	10
Blue 4GL	533	2.00	50	20	10
Blue 5B	466	1.80	10	4	10
Sky Blue FF	518	2.40	7	2	20
Blue 7GLL	Pr 432	2.00	90	45	90
Scarlet SE	327	1.00	20	5	45
Blue Green BL	Pr 470	3.00	75	35	2
Scarlet 8BS	326	1.80	10	4	20

One of the coupling components of many of the direct dyes is salicylic acid. Of approximately ten dyes containing this group, three were improved in light fastness, three were unaffected, and four were degraded when resinated. In general it can be assumed that salicylic acid has no influence, and in cases where the light fastness is degraded, an attempt will be made to show that this is possibly caused by other factors.

An interesting comparison can be made with two isomeric dyes, Red F (CI 419) and Brown M (CI 420). Both are made by coupling benzidine with salicylic acid and gamma acid. The gamma acid in CI 419 couples in the 1 position with the NH_2 group in the 2 position, whereas in CI 420 it couples in the 2 position with the NH_2 in the 7 position. The light fastness of CI 419 is rated at 25 hours before resin treatment and one hour after resinating, while the fastness of CI 420 is not appreciably affected. This would indicate that the position of the NH_2 groups with respect to the —N=N— groups might have considerable bearing on the effect of resin treatment on light fastness. Further, Congo Corinth G (CI 375), Violet N (CI 394), Orange R (CI 415), Congo Red (CI 370), Benzopurpurine 4B and 10B (CI 448 and 495), are all badly degraded by resin treatment. These dyes are all of the benzidine, tolidine, or dianisidine type and have NH_2 groups adjacent to azo groups. The only observed dye of this type that was not degraded was Red 8B (CI 436), and it might be assumed that a chlorine atom on the benzidine may have some restricting influence here, as already mentioned. No implication is intended that the amino groups on the naphthalene component in positions other than adjacent to the azo groups will not affect light fastness.

Four dyes, CI 326, 327, 346, and 349a, are improved in light fastness by resinating. These dyes contain an —NH—CO—NH— group, and no NH_2 groups. It might be possible that the resin reacts with this urea group to improve stability. One other dye with the —NH—CO—NH— group, Pink BL (CI 353), fades badly when resinated. It is produced by acid-coupling diaminodiphenylureadisulfonic acid with gamma acid, similar to CI 419. It is suggested that the amino group in the gamma acid components may be responsible for the drop in light fastness.

The green direct dyes (CI 583, 589, 593, 594) are all degraded in fastness by resin treatment. They are trisazo dyes, all of which contain H acid, acid-coupled. No proper comparison could be made, since no green dyes with known structures were found that were improved by resin treatment. However, the NH_2 group is adjacent to the —N=N— group in every case.

The effect of the position and number of OH groups in the dye molecule could not be determined.

The presence of so many reactive groups in the various direct dyes, and particularly the newer fast-to-light types, indicates that an effort to ascribe the effect of urea-formaldehyde to the molecular structure of the dye is very complicated, and only a few generalizations could be made.

CHEMICAL REACTION BETWEEN RESIN AND DYE

Formaldehyde is a reactive chemical and may readily combine with the hydroxyl, amino, and amide groups of aromatic compounds under the proper conditions.

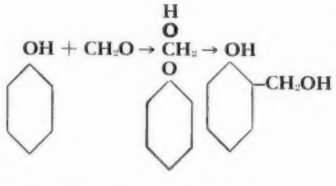
The formaldehyde set free during the application of a urea-formaldehyde resin may possibly react with the amino groups of a dye, forming a diphenylmethane derivative, as follows:

$$2D.NH_2 + CH_2O \rightarrow D.NH.CH_2.NH.D$$

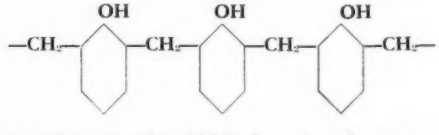
where D represents the entire direct dye molecule except the amino group. This is the reaction which probably takes place in the ordinary formaldehyde aftertreatment of direct dyes, according to Fierz-David *(4)*. Dyes of the diphenylmethane class usually have poor light fastness *(5)*.

Walker *(6)* states that under acid conditions the aromatic amines form resins with formaldehyde.

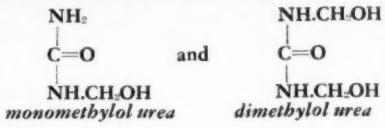
Aromatic hydroxy compounds also react readily with formaldehyde and form, for example, phenol-formaldehyde, or Bakelite, resins. Walker gives a simple mechanism for the reaction *(7)*:



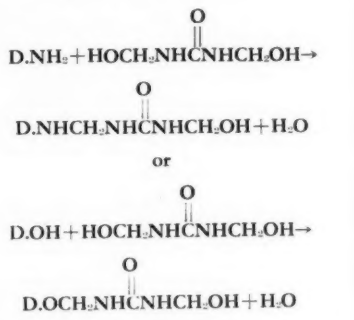
This product may then polymerize to form a resin:



Commercial urea-formaldehyde resins for textile application vary in their urea-formaldehyde molar ratio. Those used for crease-resistant finishes are usually made with a ratio of 1:1.33 and are mixtures of the following:



Reaction may also take place between the OH groups of the resin and the NH_2 or OH groups of the dye, as follows:



Heating such products no doubt will cause some rearrangement and polymerization. Wohnsiedler *(8)* states, "Methylol derivatives may be modified by reaction with various compounds. These lead to the formation of ionic complexes or modified structures, which adapt the polymers for specific uses."

Treatment of dyeings with formaldehyde and a catalyst, followed by curing, often causes a change in shade and reduces the light fastness. This is particularly true when the NH_2 group of the dyes is attached to a naphthalene nucleus adjacent to an —N=N— group. Treatment with monomethylol urea has no such action on these dyes; the light fastness is not altered. However, when these dyes are treated with dimethylol urea, the light fastness *is* affected in a manner similar to the formaldehyde-plus-catalyst treatment. In other words, as the amount of formaldehyde in the resin increases, the light fastness of the treated dyeings decreases.

There has been no attempt to study the reactions of any of the dyes with formaldehyde or methylol ureas with the object of assigning any specific reaction which might explain the change in light fastness due to the resin treatment. This is beyond the scope of this paper. It was desired, however, to enumerate some of the possibilities of reaction between the reactive groups of the direct dyes and the extremely reactive formaldehyde and the methylol ureas.

Experience has shown that the light

fastness of cotton and rayon fabrics dyed with azoic or naphthol dyes is not appreciably altered after resin treatment. In the *Du Pont Technical Bulletin (9)* the light fastness of many dyes after resin treatment was reported; the fastness of the Naphthanil dyes was shown to be comparatively little affected by resin treatment, whereas the fastness of some direct dyes was drastically reduced. The azoic dyes are usually simple compounds and do not contain active amino groups. In addition, after application, the dyes are insoluble and possibly are not affected by resin treatment for this reason. However, one might conclude that, since these dyes are not appreciably affected by resin treatment, the azo groups do not enter into reaction when so treated. Therefore, when the light fastness of the direct dyes is affected by this treatment, it is probably not due to interaction of the azo groups and the resin.

It is well known that cationic finishes degrade the light fastness of fabrics dyed with direct dyes. McLeod *(10)* reported that this is probably due to interaction of the sulfonic groups of the dye molecules and the pentavalent nitrogen of the finishing agent to form a salt. This is a general reaction for all direct dyes. McLeod stated that products of this type are really oil-soluble dyes, a class noted for its poor fastness to light. It is true that urea-formaldehyde resin treatments with an ammonium salt as catalyst, or resins with ammonia to control the pH of the reaction mixture, contain pentavalent nitrogen compounds, and various amines are formed by heat during curing *(11)*. However, some dyes are not affected by resin treatment and others are improved, so that no general reaction involving the sulfonic acid groups and resin can be postulated. It should be noted that, when a fabric dyed with Sky Blue FF (CI 518) is treated with a cationic softening agent, it fades much more rapidly than the untreated dyeing, whereas a urea-formaldehyde treatment actually reduces the fading considerably.

Data are presented farther on of the effect of formaldehyde-plus-catalyst treatments on the dyed fabrics studied. The light fastness in all cases, and the shade in some cases, were drastically affected except where Green BLL (Pr 425) *(12)* and Blue 4GL (CI 533) were used. Some of the possible reactions between dye and formaldehyde have been shown. No attempt will be made, by examination of structural formulas, to explain the difference between these two dyes, which are not affected by formaldehyde-plus-catalyst, and the dyes that are affected. It should be pointed out, however, that the formaldehyde treatment produces an entirely different effect than urea-formaldehyde treatment with many dyes. For example, Sky Blue FF (CI 518) is dulled in shade by formaldehyde and the light fastness is degraded, but, when treated with urea-formaldehyde resin, the light fastness is improved. By contrast, Green BLL and Blue 4GL are not appreciably affected by formaldehyde treatment, while resin treatment degrades the light fastness.

It has been observed that, when direct dyed fabrics are treated with urea- or melamine-formaldehyde resin by padding, some of the dye bleeds into the padding bath (this effect is greater with melamine resin). To examine this further, beaker dyeings were made, five grams of cotton being used in each case and five 2.5-ml portions of 1% solutions of Green BLL and Blue 4GL diluted to 200 ml with the following solutions:

1) Water
2) 12.5% Urea-formaldehyde 1:1.33
3) 15% Melamine-formaldehyde (M-3)
4) 15% Urea
5) 20% Formaldehyde (aq)

The dyeings were made under exactly the same conditions of time, temperature, and salt addition. The dyes remained in solution during the dyeing operation. Good exhaustion was obtained with the water, urea, and formaldehyde solutions, and the dyeings were comparable. Where the urea-formaldehyde solution was used, exhaustion was not so great and the dyeings were 25 to 50 per cent weaker. In the case of the M-3 solution exhaustion was poor, and the dyeings were only about 10 per cent of the depth of the water dyeings. This indicates the possibility of complex formation between the groups on the dye molecule that promote substantivity and the resin monomers. If the complex were formed with the sulfonic acid groups, it is probable that better exhaustion would result.

It was reasoned that, if it were possible to prevent the complex formation indicated above, the light fastness would not be altered. It was felt that addition of salt to the resin bath, or impregnating and drying the dyed fabric with salt, might cause stronger bonding of the dye to the cellulose, and, during the resin impregnation and subsequent drying, complex formation would not result. Several trials were made with Blue 4GL and Green BLL with salt and melamine- or urea-formaldehyde resins. No improvement was noted.

It was reasoned that, if resin monomers were added to a dye-padding solution and then padded, dried, and cured, the light fastness might be more severely affected than from application of resin to dyed cloth in the normal manner. Cotton cloth was padded with 0.5% solutions of both Blue 4GL and Green BLL in water, with the addition of solutions of M-3 resin and urea-formaldehyde (1:1.33), respectively. After padding, drying, and curing, the cuttings were exposed to light. M-3 caused much greater fading, applied by this method, than when applied in the normal way. The results obtained with urea-formaldehyde did not appear to differ appreciably from the normal application. It is interesting to note that there was more migration of the dye during drying where resin was added to the dye solution, probably from a drop in substantivity.

The resin was stripped from many dyed fabrics, after which light exposures were made. The fastness of Green BLL and Blue 4GL was restored, indicating that the effect of resin treatment did not change the original structure of these dyes.

From the above data, it would appear that the urea-formaldehyde monomer forms a complex with the groups of the dye molecule that promote substantivity.

EFFECT OF RESIN TREATMENT ON DYE REFLECTANCE ——— It is generally considered that, if a chemical change occurs in a dye, such a change should manifest itself by a variation in reflectance in either the ultraviolet or visible range of the spectrum.

A dye from each of the three classes (see Introduction) was treated with 25 per cent of a 50% urea-formaldehyde solution, with diammonium phosphate as catalyst. The dyes were

0.5% Scarlet SE (CI 327)
0.5% Blue 7GLL (Pr 432)
0.5% Green BLL (Pr 425)

Untreated and resin-treated samples were measured in a Hardy GE Spectrophotometer (400 to 700 mμ). There was no indication on the charts of a chemical reaction having occurred.

The same samples were then measured in a Beckman Spectrophotometer in the ultraviolet range at 320, 340, 360, 380, and 400 mμ. The reflectance values at these various wave lengths of the untreated and treated dyed samples were identical.

All the samples were then exposed in a Fade-Ometer for 25 hours. The exposed and unexposed portions were measured in the Hardy Spectrophotometer. The only sample that gave a radically different curve after exposure was that of Green BLL, resin-treated. This indicated that a chemical change had apparently occurred during the exposure.

On the other hand, it was observed that dyeings with Bordeaux B Ex (Pr 67) and Violet N Conc (CI 394) showed a marked visual change in shade after the application of urea-formaldehyde resin, or thus that a chemical reaction had probably taken place.

BREAKDOWN OF THE RESIN WITH THE FORMATION OF A PRODUCT OR PRODUCTS THAT AFFECT THE DYE

During drying, curing, or under light exposure urea-formaldehyde resins may break down, producing products which might affect the dye.

The possibility of the following reactions was studied:

1) Liberation of formaldehyde
2) Formation of hexamethylenetetramine
3) Formation of trimethylamine
4) Formation of a reducing or oxidizing agent

Results obtained on these various items are given herewith.

1) LIBERATION OF FORMALDEHYDE———The extent of the liberation of formaldehyde would depend upon the amount present, which is discussed hereafter under "Molar ratio of urea to formaldehyde". The present discussion, therefore, will consider only the liberation of some formaldehyde, and the effect thereof.

That formaldehyde is liberated from urea-formaldehyde resin is indicated by the strong odor of formaldehyde present during all stages of application and curing. It was desired, therefore, to determine the effect of formaldehyde on direct dyes. Formaldehyde alone, and in conjunction with diammonium phosphate as a catalyst, was applied to dyeings on cotton of dyes whose light fastness was found to be degraded with urea-formaldehyde resin, as listed in Table I. After application, the treated samples were dried and cured in the usual manner. Formaldehyde alone had little or no effect on the light fastness of any of the dyeings, but there was a definite shade change with Red F (CI 419), Bordeaux B Ex (Pr 67), and Violet N (CI 394). Formaldehyde in conjunction with the catalyst resulted in degraded light fastness in all cases except Green BLL (Pr 425) and Blue 4GL (CI 533), and shade changes were greater than without the catalyst. The fact that these two colors are materially degraded by urea-formaldehyde resin but not appreciably by formaldehyde and catalyst, as previously mentioned, shows that in these cases the degradation is due to causes other than the liberation of formaldehyde.

2) FORMATION OF HEXAMETHYLENETETRAMINE —— At ordinary temperatures ammonia plus formaldehyde combine to form hexamethylenetetramine, a product that was found to have a materially degrading effect on the light fastness of Green BLL (Pr 425). Time did not permit a study of this effect with other dyestuffs.

3) FORMATION OF TRIMETHYLAMINE———Trimethylamine is a decomposition product of urea-formaldehyde resins in the presence of ammonia. The application of trimethylamine to all the dyes tested showed no loss in light fastness, but shade changes were in the same order as in the case of formaldehyde.

4) FORMATION OF AN OXIDIZING OR REDUCING COMPOUND ———It seemed feasible that, if urea-formaldehyde resins decomposed, forming oxidizing or reducing agents which affected the dye, then the addition of a reducing or oxidizing material to the resin bath might neutralize this effect.

Portions of a 0.5% dyeing of Blue Green BL (Pr 470) were given a standard urea-formaldehyde catalyst treatment with the addition of the following agents:

glucose
sodium bisulfite
sodium sulfoxylateformaldehyde
sodium perborate
anthraquinone
urea peroxide

The treated dyeings were dried and cured under usual conditions and exposed in a Fade-Ometer. In no instance was there any improvement in light fastness.

MOLAR RATIO OF UREA TO FORMALDEHYDE

Urea-formaldehyde resins can be produced which have a wide range in the molar ratio of urea to formaldehyde, and the commercial products on the market vary considerably in this regard. It is important, therefore, to determine what effect a variation in molar ratio might have on the action of resins in affecting light fastness and shade change.

Resins of known molar ratios as follows were prepared in the manner explained farther on:

monomethylol urea —— molar ratio, urea to formaldehyde, 1:1
dimethylol urea —— molar ratio, urea to formaldehyde, 1:2

Baths were prepared with both resins which contained 12.5% of dry resin and 5% of the following catalysts (calculated on dry-resin content):

commercial amine hydrochloride
diammonium phosphate
ammonium chloride
ammonium lactate

Cotton fabric dyed with dyes listed in the Introduction were treated with the various baths, dried, and cured in the conventional manner. All treated samples, together with untreated samples, were exposed simultaneously in the Fade-Ometer for 16 hours. The light fastness showed wide variations between different dyes, but there was practically no variation with various catalysts. The one consistent factor with all the samples was that in every case with dimethylol urea the shade was drastically affected and light fastness was greatly degraded, much more than with monomethylol urea.

This is the first instance in this study where one factor was found which applied to every test made—namely, as the molar ratio of urea to formaldehyde decreases, the degrading effect upon light fastness increases. Subsequent study showed that, in considering the molar ratio of urea to formaldehyde, it is important that the two chemicals be reacted before application. Many direct dyeings, when padded through a 20% solution of urea and then steamed, have their washfastness materially improved. It was decided to ascertain whether dye so fixed in the fiber would show a different reaction with urea-formaldehyde resin. A 0.5% dyeing of Green BLL (Pr 425) on spun rayon was padded through a solution containing 20% urea, dried, and steamed at atmospheric pressure for one hour. Portions of the cloth so treated, together with untreated portions of the same dyeing, were finished with monomethylol urea and dimethylol urea, respectively, according to the regular procedure. Fade-Ometer exposures were made and the following results were noted: The urea-treated sample finished with monomethylol urea showed less drop in light fastness than the untreated sample with the same finish. The urea-treated sample finished with dimethylol urea showed as much decrease in light fastness as the untreated sample with the same finish. Therefore, although there was enough urea present to increase the molar ratio of urea to formaldehyde far above the 1:2 ratio of the prepared resin, they did not react, so the benefit of the higher molar ratio was not obtained.

PREPARATION OF DIMETHYLOL UREA———Add the urea to a solution of formaldehyde plus the $Ba(OH)_2$ and maintain the mixture at 25-30°C until all the formaldehyde has reacted. The end point of the reaction is determined by Tollens' reagent.

TABLE II

PREPARATION OF MONOMETHYLOL UREA AND DIMETHYLOL UREA

	Formulations	
Ingredients	*Monomethylol Urea*	*Dimethylol Urea*
formaldehyde, 37%	162.5 ml	267.0 grams
urea	125.0 grams	100.0 grams
$Ba(OH)_2$	2.5 grams	4.0 grams
water	125.0 grams	.....
solids	44.6%	54.2%
pH	6.5-7.0	6.5-7.0

When reaction is complete, neutralize to a pH of 6.5-7.0 with CO_2, dilute to 12.5% solids with water, and filter.

PREPARATION OF MONOMETHYLOL UREA———Slowly add the formaldehyde to the cooled solution of urea plus $Ba(OH)_2$, followed immediately by the addition of CO_2 to a pH of 6.5-7.0. Then dilute to 12.5% solids with water and filter.

CATALYSTS

Various catalysts were used with both monomethylol urea and dimethylol urea. In each instance the amounts were 5% based on dry-resin content. The catalysts employed were as follows:

commercial amine hydrochloride
diammonium phosphate
ammonium chloride
ammonium lactate

Dyes used were the following:

Green BLL	Pr 425
Red F Conc	CI 419
Bordeaux B Ex	Pr 67
Violet N Conc	CI 394
Green B Conc	CI 593
Green 3B Conc	CI 589
Brown M Conc	CI 420
Blue 4GL	CI 533
Blue 5B	CI 466
Sky Blue FF	CI 518

Dyed samples, treated with monomethylol or dimethylol urea in the presence of the four catalysts, were exposed in the Fade-Ometer for 16 hours, and then were evaluated for extent of fading. The results showed that no one catalyst gave superior results as regards light fastness with all the dyes tested.

An article entitled "Light Fastness of Direct Cotton Dyeings" *(2)* states that ammonium salts, when used as catalysts, lower light fastness, and also states that zinc chloride used as a catalyst yields the best light fastness. (A private communication advises that ammonium salts with formaldehyde resins may form conversion products having a basic character, which diminish light fastness.) The effect of ammonium salts may be due to the reaction of formaldehyde with ammonia to form hexamethylenetetramine. When cotton and rayon fabrics dyed with Green BLL (Pr 425) were treated with 5% hexamethylenetetramine, the light fastness was impaired, as previously mentioned.

A second series of tests was run with the same dyes and with zinc chloride (5% on weight of dry resin) as a catalyst. The pH of the resin-zinc chloride bath was 4.9. After exposure of treated samples in the Fade-Ometer for 16 hours, the light fastness was found to be superior to any hitherto obtained on these dyes.

A similar resin-zinc chloride bath was prepared, after which the pH was brought to 6.5 by the addition of ammonia. Dyeings with the above listed dyes were treated with this solution. Light exposures of dyeings so treated showed that the light fastness had been reduced to what it was when ammonium salts alone were used as catalysts.

The better results obtained with zinc chloride as a catalyst indicate that a study of other nonammonium catalysts might yield valuable information leading to the development of methods of urea-formaldehyde-resin application with less deleterious effect upon light fastness.

The results with zinc chloride as a catalyst showed so much promise that a practical plant run was made, which is described hereafter.

pH OF RESIN-FINISHED FABRIC

Cellulosic fabrics finished with urea-formaldehyde resins are usually on the acid side after curing. It is customary in plant practice to wash and neutralize resin-finished goods in a solution containing a detergent and soda ash.

In various tests described heretofore, a portion of each cured sample was retained before soaping and neutralizing. Washed and unwashed samples were exposed simultaneously in the Fade-Ometer. In every instance the washed samples had equal or better light fastness compared with unwashed samples of similar treatments. There was no instance where washing and neutralizing made a substantial change in light fastness.

A series of dyeings was then made with the following dyes:

Red F Conc	CI 419
Bordeaux B Ex	Pr 67
Violet N Conc	CI 394
Green B Conc	CI 593
Green 3B Conc	CI 589
Brown M Conc	CI 420
Blue 5B	CI 466
Sky Blue FF	CI 518
Blue 2GL	CI 533

A portion of each dyeing was treated with urea-formaldehyde and diammonium phosphate, cured, and washed in the usual way. The treated and untreated samples were divided into three parts and placed in the following liquids:

	pH
1) Distilled water	7.45
2) Solution containing 0.5% soda ash	8.74
3) Solution containing 1% glacial acetic acid	4.40

All samples were dried and then exposed in a Fade-Ometer. While some differences in light fastness were noted, the variations in pH did not have any appreciable effect upon the light fastness of these particular dyes.

EFFECT OF LIGHT OF DIFFERENT WAVELENGTHS

It was felt that any change in the degree of light fastness of a dye as a result of urea-formaldehyde treatment might be caused by the absorption of light energy either at different wavelengths or in greater or lesser amount at the same wavelength. This treatment would result either in a shift in the wavelengths of absorbed light at some critical region of the spectrum or in an increase in absorption at one particular wavelength. It was important, therefore, to determine if possible which particular region of the spectrum was responsible for fading on exposure in a Fade-Ometer.

Samples of cotton cloth dyed with ten direct dyes and both untreated and urea-formaldehyde-treated were exposed simultaneously in a Fade-Ometer. The dyes included the three classes given in the Introduction with respect to effect of resin aftertreatment. The dyeings were partly covered with filters that showed sharp cutoffs and had wavelengths at 50% transmission of 360 mμ and 400 mμ, respectively. Thus, protection from fading by the 360 mμ filter would indicate that fading was caused by the absorption of light of wavelengths between 300 and 360 mμ (the glass globe in the Fade-Ometer removes all wavelengths below 300 mμ); protection by the 400 mμ filter but not the 360 mμ would indicate a fading range between 360 and 400 mμ; the absence of either filter would point toward the visible region 400-800 mμ as being responsible for fading.

A study of these exposures indicated that there were slight changes in the absorption of either ultra-violet or visible light, or a combination of the two, resulting from resination, but there was no apparent indication of any connection with light fastness.

In an attempt to evaluate the effects of the various components involved in the fading of dyed fabrics treated with urea-formaldehyde resin, absorption spectra in the ultra-violet and visible regions of the spectrum were made on the following:

1) dye (in solution)
2) urea-formaldehyde film (on glass)
3) urea-formaldehyde film plus dye (on glass)
4) cellophane (regenerated cellulose) plus dye
5) cellophane plus dye plus urea-formaldehyde

The following three dyes, showing an increase, no change, and a decrease, respectively, in light fastness on urea-formaldehyde treatment, were used in this work:

a) Sky Blue FF (CI 518)
b) Blue 5B (CI 466)

c) Blue 2GL (CI 533)

The urea-formaldehyde films on glass had a ratio of formaldehyde to urea of 2.1 to 1, and each was cured at 300°F for three minutes. They are described as follows:

a) urea-formaldehyde plus monopropylene glycol ether plus 5% diammonium phosphate

b) like (a) plus 0.1% Sky Blue FF (CI 518)

c) like (a) plus 0.1% Blue 5B (CI 466)

d) like (a) plus 0.1% Blue 2GL (CI 533)

Each of the urea-formaldehyde films was exposed in a Fade-Ometer for 5 and 10 hours, and the absorption spectra were again measured; after 10 hours, all were badly faded.

Cellophane (Du Pont nonmoisture-proof type #300 PT) was dyed by the usual direct-dyeing techniques to a depth suitable for spectral measurements. One-half of each dyed piece was treated with 18% commercial urea-formaldehyde 50% paste and 4% diammonium phosphate based on resin solids, cured at 300°F for 5 minutes, and washed well.

Both the untreated and the resin-treated dyed cellophane samples were exposed in a Fade-Ometer for 40 hours (60 hours in the case of Sky Blue FF); all were visibly faded.

Absorption-spectra curves were made on the films. The solutions of the various dyes and the results were as follows:

A Urea-Formaldehyde Films

The urea-formaldehyde film shows only insignificant absorption between 310 and 500 mμ and thus cannot act as an ultraviolet screen for the dyestuff.

The urea-formaldehyde films containing dye should tend to accentuate the effect of the urea-formaldehyde on the dye, since the ratio of resin to dye is substantially greater than the normal amount of resin on treated dyed fabrics.

B The Effect of Urea-formaldehyde on Spectra of the Dye when the Dye is in Urea-formaldehyde Film

1) *Sky Blue FF (CI 518)*———Absorption in the region 300-500 mμ is much greater than that of the dye in solution or the dye on cellophane. The absorption maximum is shifted to a shorter wavelength (600 mμ) compared with the dye in solution (620 mμ) or the dye on cellophane (660 mμ). After exposure in a Fade-Ometer the faded urea-formaldehyde-dye film shows decreased absorption over the entire range 350-700 mμ.

2) *Blue 5B (CI 466)*———The absorption maximum is shifted to a slightly longer wavelength (600 mμ) compared with the dye in solution (590 mμ) but shorter than that of the dye on cellophane (630 mμ). After exposure the urea-formaldehyde-dye film shows slightly greater absorption in the region 350-460 mμ and less absorption in the region of the absorption maximum, which is shifted to a shorter wavelength (600 to 585 mμ) after 10 hours' exposure.

3 *Blue 2GL (CI 533)*———The absorption maximum is shifted to slightly longer wavelength (600 mμ) compared to the dye in solution (590 mμ) or the dye on cellophane (605 mμ). Exposure of the urea-formaldehyde-dye film results in less absorption in the region of the absorption maximum, which is shifted first to slightly longer wavelengths (600 to 620 mμ) after five hours' exposure, then to a shorter wavelength (570 mμ) after ten hours' exposure.

C The Effect of Urea-formaldehyde on Spectra of the Dye on Cellophane

1) *Sky Blue FF (CI 518)*———Treatment with urea-formaldehyde decreases the absorption in the regions 305-350 mμ and 575-675 mμ and slightly increases the absorption in the region 450-575 mμ. After exposure in a Fade-Ometer, the urea-formaldehyde-treated sample shows greater absorption than the untreated over the range 310-650 mμ.

2) *Blue 5B (CI 466)*———Treatment with urea-formaldehyde results in decreased absorption over wavelengths 310-650 mμ. After fading, the urea-formaldehyde treated sample shows greater absorption in the region 310-400 mμ but less in the region 400-600 mμ compared with the untreated.

3) *Blue 2GL (CI 533)*———Treatment with urea-formaldehyde decreases the absorption in the region 305-325 mμ and increases the absorption over the range 350-625 mμ, while the absorption maximum appears to be shifted to slightly longer wavelengths. After exposure, the urea-formaldehyde-treated sample shows less absorption in the regions 310-360 mμ and 480-660 mμ but greater absorption in the region 675-750 mμ compared with the untreated.

A study of the results of this experiment shows no basis for correlation between the effect of urea-formaldehyde on the absorption spectra of the dyes, either in urea-formaldehyde films or in cellophane, and the effect of urea-formaldehyde on light fastness.

If this result were confirmed by data on a larger group of dyes, the conclusion would probably be that a change in the degree of fastness to light of a dye as a result of urea-formaldehyde treatment must be the result of a change in the sensitivity of the dye molecule to the fading reaction rather than the result of a change in the wavelength of absorption or in the amount of light energy absorbed.

The fading of dyestuffs is a photochemical reaction *(13)*—i e, a chemical reaction initiated by the absorption of energy of wavelengths in the ultra-violet or visible regions of the spectrum. Dyes, being colored, obviously absorb radiation in the visible region (400-800 mμ), and absorption spectra show that absorption also takes place in the ultra-violet regions. Since the amount of energy of wavelength below 300 mμ is negligible in sunlight and is removed by the Pyrex globe of the Fade-Ometer, the only portion of the ultra-violet of interest in fading is that between 300 and 400 mμ.

When radiation is absorbed by a dye molecule, electrons are raised from a ground state of low energy to an excited state of high energy, thus producing an "activated" molecule. Such excited molecules can then lose this extra energy as heat, fluorescence, by intramolecular deactivation, by chemical reaction, etc *(13)*. Actually, in the case of dyes, only a very small fraction of the absorbed energy is effective in promoting photochemical reactions, and, consequently, the fading process is a relatively slow one. The susceptibility of the dye molecule to chemical reaction on absorption of radiation is determined by the atomic and electronic structure of the molecule.

The absorption of ultra-violet radiation by organic molecules is known to promote reactions of many types *(13, 14)*, such as decomposition (photolysis), oxidation, reduction, hydrolysis, polymerization, isomeric change, and synthesis. In the case of the fading of azo dyestuffs, the mechanism is believed to be either reduction, oxidation, or photolysis, with the chromophor group or groups being the point of reaction. Thus, in the case of the azo group, reduction may give the hydrazo derivative, which on further reduction would form two new amines; while oxidation may lead to the azoxy derivative. Any of these reactions would result in a bathochromic effect, as illustrated by azobenzene (orange), azoxybenzene (yellow), hydrazobenzene (colorless) and aniline (colorless).

PLANT TRIAL

When zinc chloride was used as a catalyst, as previously described, the light fastness was so much superior to that obtained with other catalysts that it was decided to make a similar application under plant conditions. Such a trial would determine whether, with this catalyst, the other properties of a urea-formaldehyde resin finish would be retained.

A piece of spun-rayon fabric was dyed

TABLE III

TESTS OF PLANT-FINISHED CLOTH

Catalyst	Zinc Chloride	Diammonium Phosphate
% Fixed resin	9.5	10.7
% Fixed resin lost on soaping	25.5	23.3
Free formaldehyde	5/100,000	5/100,000
Crease resistance, Warp	3.0	3.2
Filling	3.0	3.2
Tensile strength, wet, Warp	39.3	32.3
Filling	30.0	30.0
Shrinkage, Warp	2.0%	1.6%
Filling	1.1%	1.25%

with Green BLL (Pr 425). Resin finishing baths were prepared as follows:

A) 130 lb urea-formaldehyde 50% paste (commercial)
3.25 lb zinc chloride
50 gal (pH 4.9)

B) 130 lb urea-formaldehyde 50% paste (commercial)
3.25 lb diammonium phosphate
50 gal (pH 5.15)

One-half of the dyed cloth was padded with "A", and the other with "B" under similar conditions. The pieces were dried, cured 1½ minutes at 365°F, soaped in detergent and soda ash, rinsed, dried, and framed. The finished pieces were then submitted to the usual tests for urea-formaldehyde-finished cloth as reported in Table III.

The above results do not show any appreciable difference between the catalysts as regards the various factors listed. After 24 hours of Fade-Ometer exposure the portion with zinc chloride as the catalyst was faded approximately 1/3 as much as that with diammonium phosphate.

The resin-finishing baths were allowed to stand in order to observe their stability. After 9 hours the bath containing diammonium phosphate became cloudy; after 12 hours the bath containing zinc chloride was still clear.

SUMMARY

1) The molecular structure of many direct dyes has been studied to determine why urea-formaldehyde treatment improves, does not affect, or impairs the light fastness of direct-dyed fabrics.

2) The reactive groups are OH and NH_2 in most cases, and their number and position in the dye molecule have much influence in determining the effect of resin treatment on light fastness.

3) Treatment with formaldehyde plus catalyst reduced the light fastness of the direct dyes with NH_2 groups attached to the naphthalene nucleus adjacent to azo groups. However, the chemical modifications influencing the light fastness of direct dyes on treatment with formaldehyde plus catalyst are frequently not the same as on treatment with urea-formaldehyde plus catalyst. Of the dyes studied, those that were adversely affected by formaldehyde plus catalyst were not affected by monomethylol urea plus catalyst.

4) Increasing the molar ratio of formaldehyde to urea in the resin increases the degrading effect on light fastness.

5) With the various dyes tested it was found that a non-ammoniacal catalyst had less effect in reducing light fastness than ammoniacal types.

6) Although it is possible to predict that some dyes will be adversely affected by resin treatment, a general rule applicable to all direct dyes was not found that predicts the influence of urea-formaldehyde treatment on light fastness.

CONCLUSION

So many factors are involved in the effect of urea-formaldehyde resin on the light fastness of direct dyes that no set of conditions was found upon which the effect of the resin treatment on the light fastness could be definitely predicted. Precise information regarding the influence of resins on light fastness must still be determined by an actual trial with each dye. This study revealed, however, that by careful selection of catalyst and by controlling the molar ratio of urea to formaldehyde, the degrading effect of the resin on those dyes whose fastness is impaired should be materially modified.

ACKNOWLEDGMENTS

The assistance given by the following organizations in contributing materials, technical information, services of personnel, use of laboratories and plant equipment is acknowledged with thanks and appreciation:

American Cyanamid Company

Apponaug Company

Arnold, Hoffman & Company, Inc

Bradford Dyeing Association (USA)

Calco Chemical Division, American Cyanamid Company

Carbic Color & Chemical Company, Inc

Ciba Company, Inc

Cranston Print Works Company

E I du Pont de Nemours & Company, Inc

General Dyestuff Corporation

Glenlyon Print Works

Greenville Finishing Company, Inc

National Aniline Division, Allied Chemical & Dye Corporation

Products Development Laboratory

Rohm & Haas Company

Sandoz Chemical Works, Inc

The Sherwin-Williams Company

University of Rhode Island

US Oil Company

Verona Dyestuffs Division of Verona Chemical Company

Warwick Chemical Division, Sun Chemical Corporation

REFERENCES

(1) Smith, P W, *J Soc Dyers Colourists* 65, 744 (1949).

(2) Hansen, H, *Z ges Text Ind* 54, 40 (1952); abst *J Soc Dyers Colourists* 69, 173 (1953).

(3) Ciba Ltd, B P 609,362.

(4) Fierz-David, H E, "Künstliche Organische Farbstoffe", 1926, p 195.

(5) Venkataraman, K, "The Chemistry of Synthetic Dyes", 1952, p 598.

(6) Walker, J F, "Formaldehyde", 1944, p 203.

(7) *Ibid*, p 164.

(8) Wohnsiedler, H P, *Ind Eng Chem* 44, 2679 (1952).

(9) *Du Pont Technical Bull* 1, 73 (1945).

(10) McLeod, E D, *Am Dyestuff Reptr* 37, 31 (1948).

(11) Walker, *ibid*, 122.

(12) Venkataraman, *ibid*, p 586.

(13) *Ibid*, p 1213.

(14) Bowen, E J, *Quart Revs* 4, 217 (1950).

(15) Vickerstaff, T, "The Physical Chemistry of Dyeing", (1950), p 158.

Membership Applications

(Concluded from page P1)

STUDENT

Benjmin H Bell—Clemson College. Sponsor: J Lindsay, Jr.

Robert B Huey—Clemson College. Sponsor: J Lindsay, Jr.

Guy D Moulton—Clemson College. Sponsor: J Lindsay, Jr.

Richard L Neely — Clemson College. Sponsor: J Lindsay, Jr.

Samuel G Thompson—Clemson College. Sponsor: J Lindsay, Jr.

Howard Greenberg — North Carolina State College School of Textiles. Sponsor: H A Rutherford.

Platte B Moring, Jr—North Carolina State College School of Textiles. Sponsor: H A Rutherford.

John E Ward—North Carolina State College School of Textiles. Sponsor: H A Rutherford.

Yves Handfield — St Hyacinthe Textile School. Sponsor: G Boule.

Application for Transfer to Senior Membership

Arthur W Bloxham	John J Kelleher
Walter C Carter	Rene A Putinier
Frank H Dumproff	Robert A Strickland
Lindsey S Gifford, Jr	John T Taylor
Stanley T Holland, Jr	

December 18, 1953

CORPORATE

B F Goodrich Chemical Co
Augusta Chemical Company

SENIOR

Adolph Berli — President, Mastercraft Linen Fabrics Corp, West Warwick, R I. Sponsors: W Milne, H H Hollingworth.

Aldino Brizzi—Head dyer, Pyramid Piece Dye Works, Paterson, N J. Sponsors: A Malick, H M Friedman.

Wallace R Brode—Associate director, National Bureau of Standards, Washington, D C. Sponsors: W D Appel, M W Sandholzer.

Edwin Brunnschweiler—Leiter der Laboratoriums-Abteilung, Faerberei Schlieren A G, Schlieren, Switzerland. Sponsors: E A Krahenbuhl, W Ernst.

Paul B Bullock—Dyer, half hose, Silver Knit Hosiery Mills, High Point, N C. Sponsors: J V Boone, J H Troutman.

Nelson J Callahan—Assistant dyer, Cloverdale Dye Works, High Point, N C. Sponsors: G S Eaves, K W Pulliam.

Charles M Christiansen—Supt of finishing, Windsor Print Works, North Adams, Mass. Sponsors: H Gendreau, W J Kapinos.

Rene Debacker—Dyer, United Piece Dye Works, North Charleston, S C. Sponsors: J R Williams, M Goldemberg.

Alan S Fern—Dyeing technologist, Imperial Chemical Industries Ltd, Manchester, England. Sponsors: A C Merrill, Jr, A McGregor.

Alfred Foulds—Head of Dye Testing Laboratory, General Aniline & Film Corp, Easton, Pa. Sponsors: D I Randall, A Stefcik.

Bill Gammons—Yarn dyer, Silver Knit Hosiery Mills, High Point, N C. Sponsors: J V Boone, J H Troutman.

Ernest J Garrott—Dyer, American Dyeing Corp, Rockville, Conn. Sponsors: R W Joerger, J J Kelley.

Benjamin H Hallowell—Industrial salesman, Morton Salt Co, Boston, Mass. Sponsors: T R Smith, J C Drake.

James A Holder, Jr—Dyer, Delta Finishing Co, Div of J P Stevens Co, Wallace, S C. Sponsors: T J Ratajczak, J M Andrews.

Kaneki Noyori—Chief of Chemical Textile Lab, Kanegafucho Chemical Industry Co, Hyogoku, Kobe, Japan. Sponsors: A M Lea, J V Moore.

Tokukichi Kimura — Engineer, Tokyo Boeki Kaisha, Ltd, Chiyoda-Ku, Tokyo, Japan. Sponsors: G G Neisser, C Z Draves.

Ben H Kirby—Supt of operations, Pittsburgh Coke & Chemical Co, Pittsburgh, Pa. Sponsors: K C Ruppenthal, A E Medas.

James W Lakin — Company engineer, American & Efird Mills, Inc, Mt Holly, N C. Sponsors: J S Rogers, C F Martin, Jr.

Harold P Landerl—Research chemist, E I du Pont de Nemours & Co, Inc, Jackson Laboratory, Wilmington, Del. Sponsors: J F Laucius, R A Clarks.

Francis J Lynch—Dyer, Collins & Aikman Corp, Bristol, R I. Sponsors: M E Johnson, W D Rochon.

John W Maher—Foreman dyer, Alexander Smith, Inc, Yonkers, N Y. Sponsors: H Evans, E Field.

Max Millman—Dyer, Milpac Dyeing Co, Inc, Brooklyn, N Y. Sponsors: E D Lind, W H Espelin.

Melvin S Mitchell—Assistant dyer, Rock Hill Printing & Finishing Co, Rock Hill, S C. Sponsors: J L Dudley, D W Castner.

Nicholas S Newman—Supt of finishing & chemist, Lee Dyeing Co of Canada, Lachine, Que, Canada. Sponsors: M Fishman, E J Levine.

Robert M Pines—Chemist, Alrose Chemical Co, Providence, R I. Sponsors: A Darby, G Hermann.

Sabi L Sampson—General supt, Telas Oxford, S A, San Pedro, Mexico. Sponsors: M G Bruckmann, G A Jonic.

Hans U Schmidlin—Chemist, Bleaching & Dyeing Dept, Faerberei Schlieren A G, Zurich, Switzerland. Sponsors: H H Zweifel, T Egger.

Joseph R Stefanacci—Boss dyer, Hollywood Piece Dye Works, Passaic, N J. Sponsors: A Malick, H M Friedman.

Peter J Tocco—Dyer, Modern Piece Dye Works, New York, N Y. Sponsors: W H Espelin, F J Peterson, Jr.

Luis H Velez—Chemical engineer, Favrica de Hilados y Tejidos El Hato, Medellin, Colombia. Sponsors: G G Neisser, E P Hoffmann.

Lars-Eric Wennerlund — Technical rep, Du Pont Dept: Elof Hansson, Goteborg, Sweden. Sponsors: W Hellmann, S Smith.

Reginald F York—Senior technical rep, Howards of Ilford Ltd, Essex, England. Sponsors: E A W Boyce, G B Angus.

JUNIOR

Robert M Dameron — Salesman, Dow Corning Corp, Midland, Mich. Sponsors: G E Faulkenberg, H S Falls.

Eric A Schlaginhaufen—Textile chemist, Geigy Co, Inc, New York, N Y. Sponsors: R C Allison, E A Moggio.

ASSOCIATE

Charles A Kratsch—Chemical & color technician, Commonwealth Laboratories, Inc, Gloversville, N Y.

John D Smith—Sales supervisor, Morton Salt Co, New Orleans, La.

Wilburn P Williams—Technical service (Textiles), Tennessee Corp, Atlanta, Ga.

STUDENT

Constantine A Nanopoulos—New Bedford Institute of Textiles & Technology. Sponsor: F Tripp.

Robert C Welch—New Bedford Institute of Textiles & Technology. Sponsor: F Tripp.

William A Burton—Rhode Island School of Design. Sponsor: H B Sturtevant.

Joseph D Cox—Rhode Island School of Design. Sponsor: H B Sturtevant.

Mary E Gridley—North Carolina State College. Sponsor: H A Rutherford.

Joseph P Hester—North Carolina State College. Sponsor: H A Rutherford.

John J Conlin—Philadelphia Textile Institute. Sponsor: W H Hughes.

John Wright, Jr — Philadelphia Textile Institute. Sponsor: W H Hughes.

Athanasios Anninos—Lowell Technological Institute. Sponsor: E E Fickett.

Piet B Badenhorst—Lowell Technological Institute. Sponsor: E E Fickett.

Alan A Denio—Lowell Technological Institute. Sponsor: E E Fickett.

Philip S Lamprey—Lowell Technological Institute. Sponsor: E E Fickett.

Frederick W Obear—Lowell Technological Institute. Sponsor: E E Fickett.

James S Murray—Alabama Polytechnic Institute. Sponsor: J C Farrow.

Application for Transfer to Senior Membership

Robert G Ellis	Arthur A Kuehn
Stanley T Holland, Jr	George O Langlais
Thomas P Innes	Henrique Rosenfeld

Report of Annual Meeting———Rhode Island Section

December 4, 1953

AT THE annual meeting of the Rhode Island Section, held at the Sheraton-Biltmore Hotel in Providence, R I, on December 4th, 1953, the following officers, councilors and committeemen were elected for 1954:

Chairman ——— Arthur F McLean, Glenlyon Print Works

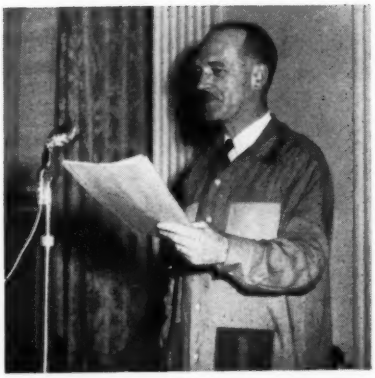
Vice-Chairman ——— Remus F Caroselli, Owens-Corning Fiberglas Corp

Treasurer———J William Timperley, Kenyon Piece Dye Works

Secretary ——— Charles F Stokes, Carbic Color & Chemical Co

Councilor—Ernest J Chornyei, Bradford Dyeing Assoc (USA) (replacing Alden D Nute—term expired)

Sectional Committeemen———George T Roberts, Greenville Finishing Co; Arthur Hustwit, Bradford Dyeing Assoc (USA); Robert H Phillips, Cranston Print Works; Richard M England, Monsanto Chemical Co



W George Parks delivering the 1953 Rhode Island Section Intersectional Contest Paper; Dr Parks is wearing a coat that demonstrates the fading problem

Daniel Sassi, Interchemical Corp, presented a paper entitled "A Rapid Method of Identification of Textile Fibers in Blends", which was illustrated by a series of lantern slides.

W George Parks, University of Rhode Island, read the first-prize-winning 1953 Intersectional Contest Paper of the Rhode Island Section, "An Investigation of the Effect of Urea-Formaldehyde Resins on the Light Fastness of Direct Dyes".

Approximately 160 members and guests attended the dinner and technical session.

Respectfully submitted,
CHARLES F STOKES, *Secretary*

Officers for 1954
(L to r): E J Chornyei, Councilor; Charles J Stokes, Secretary; J William Timperley, Treasurer; Raymond F Caroselli, Vice Chairman; Arthur F McLean, Chairman

Part of the student group from New Bedford Institute of Textiles and Technology

Head Table Conferences
(L to r): Ernest J Chornyei, Daniel Sassi, Arthur F McLean, Charles F Stokes

Research group, Belding Corticelli, Putnam, Conn

(Photos by Kenneth C Everett)

Report of Annual Meeting——NNE Section

December 4, 1953

AT THE Annual Meeting of the Northern New England Section, held on December 4, 1953 at the Lowell Technological Institute, Lowell, Mass, talks were presented by Roland E Derby, Sr, Textile Aniline & Chemical Co, and Kenneth L Dorman, Goodall-Sanford, Inc. Guests at the dinner included LTI faculty and members of the college's student chapter.

Mr Derby spoke on "Pilot Plant Possibilities in the Textile Field", the subject of his address at the 1953 Convention upon acceptance of the Olney Medal. Mr Dorman's talk was based on the Section's 1953 Intersectional Contest Paper, "The Structure and Dyeing Characteristics in Hydrophobic Fibers".

The following officers were elected to serve for 1954:

Chairman —— Ernest R Kaswell, Fabric Research Laboratories, Inc

Vice Chairman——John M Gould, Barre Wool Combing Co, Ltd

Treasurer——William W Pennock, E I du Pont de Nemours & Co, Inc

Secretary——Axel W Mack, Dexter Chemical Corp

Councilors —— Elmer E Fickett, Lowell Technological Institute; John P Ploubides, Pacific Mills; Robert D Robinson, Bachman-Uxbridge Worsted Corp; Sawyer F Sylvester, Monsanto Chemical Co.

Sectional Committeemen —— Leslie Christison, American Woolen Co; Kenneth L Dorman, Goodall-Sanford, Inc; Gerald F Quigley, Agawam Dye Works, Inc.

Respectfully submitted,
AZEL W MACK, *Secretary*

—♦ ♦—

Meeting Report—— WNE Section

December 11, 1953

APPROXIMATELY 70 members and guests attended the December 11th meeting of the Western New England Section at Rapp's Restaurant, Shelton, Connecticut.

Featured speaker of the evening was Paul J Sullivan, a member of the technical staff of the Synthetic Detergents Department, National Aniline Division, Allied Chemical & Dye Corporation. His subject: "Surface-Active Agents and Their Far-Reaching Influence in the Textile Industry".

Respectfully submitted,
N J GLADE, *Secretary*

Meeting Report—— Philadelphia Section

December 4, 1953

THE last meeting of the 1953 season of the Philadelphia Section was held on December 4th at Kugler's Restaurant in Philadelphia, Pa.

Approximately 166 members and guests were present to hear W P Deising, General Electric Co, speak on "Progress in Industrial Ultrasonics".

J A Branegan, Chairman of the Tellers, announced the following officers and councilors for 1954:

Chairman —— F V Traut, Globe Dye Works Co

Vice Chairman——T H Hart, Hart Products Co

Secretary——T J Scanlon, Dexter Chemical Corp

Treasurer —— P Theel, Philadelphia Textile Institute

Sectional Committeemen——E Burrell, The Roxborough Co; J W MacNeil; M J Reider; R A Shimp, E I du Pont de Nemours & Co, Inc

Councilors——C T Anderson, Ciba Co, Inc; E C Diehl, Ankokas Dyeing and Processing Co; H L Morgan, James Lees & Sons Co; A E Raimo, John Campbell & Co, Inc; E E Rettberg, Jr, Scholler Bros Inc; J A Woodruff, American Viscose Corp.

Committee chairmen appointed by Mr Traut for 1954 are as follows:

C T Anderson, Ciba Co, Inc (Program); M A Noonan, Becco Sales Corp (Membership); J W MacNeil (Publicity); F E Nevins, Ciba Co, Inc (Dining); D W Robinson, Alco Oil & Chemical Corp (Outing); R B Stehle, Allegheny Dye Works (Bylaws); W S Sollenberger, American Viscose Corp (Sectional Advisory Research); P L Speakman, E I du Pont de Nemours & Co, Inc (Intersectional Contest); and F J De Maria, James Lees & Sons Co (Educational).

Respectfully submitted,
THOMAS J SCANLON, *Secretary*

—♦ ♦—

Meeting Report—— NBITT Student Chapter

November 23, 1953

THE New Bedford Institute of Textiles and Technology held its third meeting of the season on November 23, 1953 with 16 members present.

Edmund J Dupre was elected advisor for a term of two years.

Chairman Wallace Baker presented for discussion the bylaws as drawn up by the Bylaws Committee. No action was taken at the time.

Respectfully submitted,
DAVID A MORRIS,
Corresponding Secretary

THE APPLICATION OF VAT DYES

Monograph No. 2 of the

American Association of Textile Chemists and Colorists

"The group of fifteen editors responsible for this monograph consists of a well-balanced cross-section of American industry concerned with the production, marketing and application of vat dyes. The AATCC is to be congratulated on the production of a comprehensive survey of American vat dyeing and printing practice which is the major theme of this application . . . the book will be useful as a work of reference at this side of the Atlantic and as a working manual for the American colorists for whom it was designed. . . . If a clear account of American practice is required . . . the enquirer *must* have access to this volume".—*JOURNAL OF THE TEXTILE INSTITUTE* (England).

"This book . . . is abreast of the latest technical developments and research. Its value is increased because of the lack of books in this field today . . . we can readily recommend this book to all technical and practical men".—*MELLIAND TEXTILBERICHTE* (Germany).

The price of "The Application of Vat Dyes" is $5 per copy, postpaid, to members; to nonmembers it is $6 per copy. Send your check or money order to the

SECRETARY AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

P O BOX 28, LOWELL, MASSACHUSETTS

• PATENT DIGEST •

PAUL WENGRAF

PIGMENT PRINTING——— Aqueous Systems Instead of Emulsions Used D, 2, 07

U S Pat 2,641,554
(Du Pont———Meunier, Summerill———
June 9, 1953)

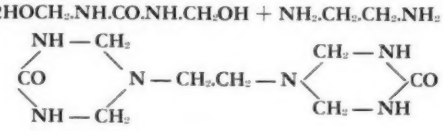
The customary pigment-printing process (as described in recent references) calls exclusively for the use of water-in-lacquer or lacquer-in-water emulsions. The current specification points to the many inconveniences involved in applying organic solvents that are obnoxious and sometimes toxic. Emulsion products are difficult to remove from the equipment; moreover, efficient handling of emulsions in general requires special experience. It appears desirable to avoid these drawbacks by using all-aqueous systems instead of emulsions for pigment printing.

The special binder is developed for this purpose by condensing (at a pH of 0.25-4.0) urea, formaldehyde and a polyamide, wherein the amino groups are separated from one another by two C atoms, e g, ethylene diamine, diethylene-triamine, triethylene tetramine, etc. This reaction produces *triazone resins* fixed upon the fiber in the presence of the usual starch thickener in drum-curing, steam-curing or acid-aging equipment.

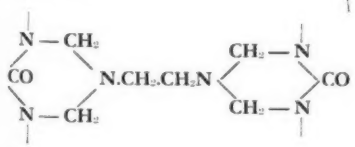
Formation of the triazone rings may be explained by the following steps:

1) urea reacts with formaldehyde to give dimethylolurea;

2) dimethylolurea reacts with ethylene diamine (the example calls for diethylene triamine) to form two triazone rings:



3) upon further reaction with 4 mols formaldehyde a tetramethylol compound is formed giving in acid solution by intermolecular condensation polymers with the recurrent units



linked by methylene groups. Resins obtained by this method are blended and vigorously stirred with a starch paste, an aqueous pigment paste, e g, polychloro copper phthalocyanine, and a curing catalyst, such as dibasic ammonium phosphate or ammonium thiocyanate, sulfate or tartrate.

The prints are found to be fast to washing, crocking, chlorine and light after curing; thus it can be assumed that the starch thickening portion can be removed afterwards in a washing operation to avoid undue stiffness.

No references are cited by the Patent Office.

PIGMENT PRINTING——— Reaction Products of Polyamines and Cross-Linking Agents D, 2, 07

U S Pat 2,643,958 (Farbenfabriken Bayer———Kleiner, et al———June 30, 1953)

This pigment-printing method is similar to the one discussed in U S Pat 2,641,554 in that no emulsions, but aqueous polymerizable solutions, are applied. The binder is soluble in aqueous printing pastes or padding solutions.

Essentially the patented composition consists of a) resinous polyamides containing primary or secondary amino groups, insoluble in water but soluble in the form of their salts, or b) polyfunctional compounds capable of reacting with amino- or imino groups, termed hereafter as "cross-linking agents".

The soluble salts (a) do not react with the cross-linking agents (b) but a reaction occurs in setting free the base of (a) either by an alkaline treatment or by using salts of volatile acids liberated in a subsequent heat treatment, and also by simple drying. The alkaline treatment is preferred in combinations of pigment-with-vat printing or with coupling dyes requiring alkaline development.

Regarding a): polyamines of higher molecular weight (above 200) obtained by polymerization are preferred. Numerous examples are presented, among them polymeric esters containing amino or imino groups, which result, for instance, by the co-polymerization of acrylic esters with acrylonitrile and the reduction partly or totally of the nitrile groups to amino groups. Other basic polyesters may be prepared from isocyanate—modified polyesters reacted with polyamines (described in a co-pending application).

Regarding b): the polyfunctional cross-linking agents must contain groups reacting with primary or secondary amines, for example, additional products of polyisocyanates (hexane-di-isocyanate), and a diketone or a ketone ester reacting at elevated temperatures as free polyisocyanate (see references below). A particularly suitable cross-linking agent is the reaction product of acrylonitrile and anhydrous formaldehyde with acetic anhydride as a catalyst. In this event a triazine derivative (termed as hexahydro -1-3-5- triacrylyl -s-triazine) probably is generated. This is used in most of the examples.

The present printing or padding method does not require any solvent. In addition the film-forming binder solutions are water soluble, are stable for some days or weeks, will penetrate the fibers well and will fix instantly in low-temperature drying (or by an alkaline aftertreatment). The films have good elasticity, are supple, and will not impair the hand of the fabrics.

Example: an acetic acid solution (a) is prepared by reacting a polymerized acryl ester of amino methylamino propane until the product becomes soluble in acetic acid. 200 p of (a), 200 p of an aqueous pigment dye paste, 16 p of the triazine type agent (b), 300 p tragacanth thickener and 284 p water are mixed to a paste, which is printed on cotton. After drying for 10-5 minutes at 60-100° C prints reported to be of excellent fastness and good hand are obtained.

Many examples referring to padding, resists prints, etc are presented.

Among the references cited by the Patent Office:

U S Pat 2,468,713 (American Cyanamid/1949) refers to aromatic isocyanates, particularly compounds substituted by nonsaturated aliphatic chains, and polymerization or co-polymerization products containing functional isocyanates. These are useful for treating textile materials, as well as for a great number of other applications.

U S Pat 2,136,928 (I G Farben/1938): producing resinous amines rich in nitrogen by reacting polyamines or their salts with alkylene polyoxides (polyvalent alkylene oxides) to obtain compounds of increased dyestuff affinity.

French Pat 876,285 (I G Farben/1942): preparing di-isocyanate addition products (as used in the present method), e g, a polymethylene di-isocyanate plus 2 mols malonic acid.

U S Pat 2,526,639 (Du Pont/1950): preparing a shrinkproofing compound by reacting a polymeric amine with formaldehyde [cf *Am Dyestuff Reptr 40*, 138 (1951)].

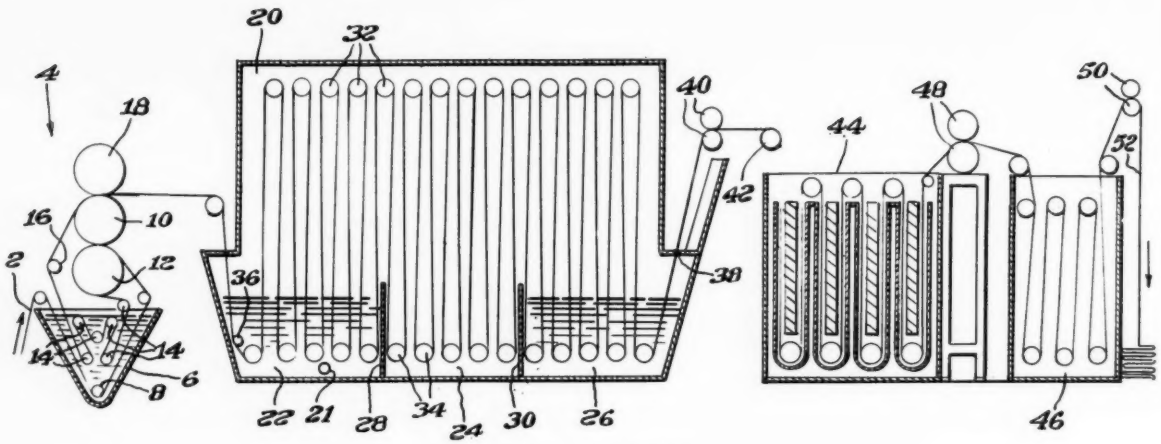


Figure 1—USP 2.628,883

BOTTOM CHROMING WOOL ——CONTINUOUS PROCESS C, 4, 06

U S Pat 2,628,883
(Pacific Mills——Dalton, Ploubides——Feb 17, 1953)

The dyeing of prechromed (bottom-chromed) wool is known to give superior results, but the process is more expensive than other chrome-dyeing processes, such as metachrome or top-chrome dyeing. The purpose of the present invention is to carry out the bottom-chrome operation in a less time-consuming and less costly way, while providing a better color yield.

This problem has been solved, as claimed in the current invention, by mordanting cloth in a continuous process. (See Figure 1). The cloth is first impregnated in the three-bowl padder (4) using a sodium dichromate solution at 70-212° F in the presence of an appropriate wetting agent, e g, an alkylaryl polyether alcohol (an Igepal type product). It is then carried to the steam box (20) where it alternately passes through the hot reducing acid, e g, hydroxyacetic acid (pH 2-3), in compartment (22) and the open space filled with steam above this compartment. Steaming is continued in compartment (24) and finally the cloth is washed in water at (26). After it leaves box (20) washing is continued in boxes (44 and 46) with water to which preferably some diammonium phosphate has been added to bring the pH up to 5.5-6.0.

Dyeings of superior quality, good levelness and colorfastness are said to be obtained in this process. Examples refer to combinations of 6-7 different dyestuffs.

Among the references cited by the Patent Office:

U S Pat 2,222,285 (General Aniline & Film/1940): crock fastness of insoluble azo dyes is improved by washing with inorganic or organic salts which form water-soluble complexes with alkaline earth salts, e g, sequestering agents, such as pyrophosphates, metaphosphates, nitrilo triacetic acid, etc.

U S Pat 2,106,634 (Carthage Mills/1938): printing material for floor covering with mordant colors in continuous process by first impregnating with a mordant and then printing the goods with the dye preparation while still wet.

U S Pat 1,970,578 (I G Farben/1934): producing textile assistants in general by treating higher alcohols or amines with ethylene oxide, these condensates being used inter alia for dyeing processes.

U S Pat 1,492,051 (Du Pont/1924): dyeing chrome-mordant colors by using a combination of dichromate with lactic acid strong enough to reduce the dichromate but not to attack iron of the dyeing vessels.

Brit P 9,286/1886 (Gatty): mordanting wool by first moving the material for 1-2 hours in an alkali dichromate or chromate solution plus sulfuric acid, then de-oxidizing, i e, precipitating the oxides on the fibers by a boiling water treatment, and optionally adding sugar, starch or tartaric acid.

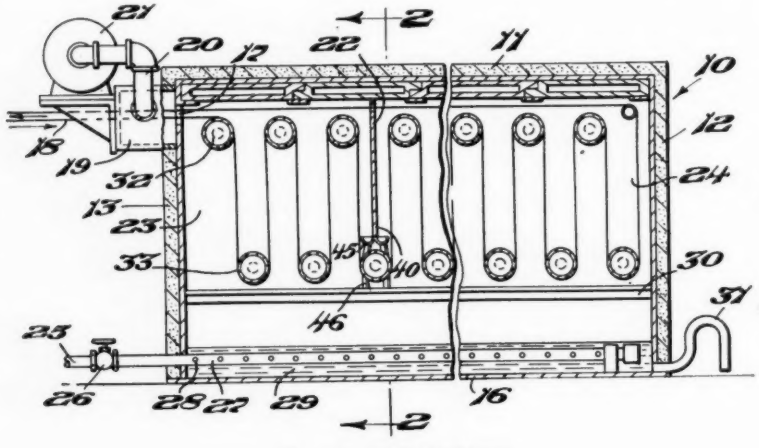


Figure 1—USP 2,628,884

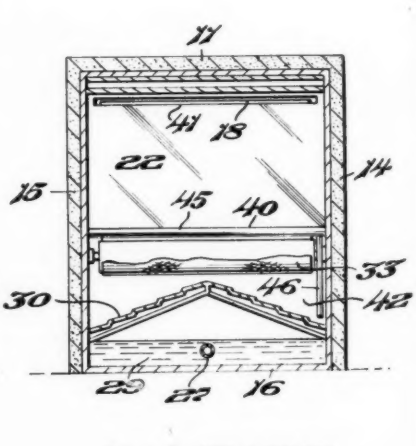


Figure 2—USP 2,628,884

AGER DIVIDED IN TWO OR MORE SEPARATE CHAMBERS D, 5

U S Pat 2,628,884
(Jacoby———Feb 17, 1953)

Liberation of latent heat and vaporization of steam by absorption of moisture causes live steam to rise to temperatures of 240° F or more. High temperatures of this order and especially lack of humidity are apt to give uneven chemical reactions in developing vat prints. The main object of the present process and apparatus is to prevent undue rise of temperature and decrease of the moisture in the surrounding atmosphere, particularly in the first portion of the reaction, by *directing a greater volume of steam* to the part of the ager where this reaction principally occurs.

The inventor refers to his own U S Pat 1,663,845/1928 (assigned to Deltex Co), which is modified by the present invention. The older patent had as its main object a method of supplying sufficient moist steam to prevent drying at the first point of reaction. This is accomplished by inserting water-filled troughs extending from one wall of the ager to the opposite one.

The current method utilizes a steam chamber (10) provided with opening (17) through which the fabric enters and leaves, passing a chest (19). (See Figure 1). A conduit (20) is linked to a pump or blower (21) to exhaust excess steam. An essential part of the apparatus is the wall (22) dividing the casing (10) into two chambers, which are preferably of different dimensions. The bottom of the casing contains a steam pipe (25—27) extending through the whole length of this chamber and surrounded by water (29) to bring the steam to the humidity required. Excess water is sucked off by water trap (31).

The chemical (reducing) action takes place mainly in the first compartment (zone 23 of the ager). In order to prevent undue overheating by this chemical reaction, moist steam flows constantly through the lower end of the partition (40). Thereby all the steam of the zone (24)—right hand of (22)—passes zone (23) and counteracts the rise of temperature. Consequently there will always be present an excess of moist steam and some turbulence at the point of the principal reaction.

Figure 2 shows a sectional view of the device on line 2-2 of Fig 1, illustrating the situation of the opening (42) of the partition and baffles or shingles (30) inserted to prevent water from splashing on the goods and to distribute equally the steam within the chamber.

Zone (24) necessarily has a greater volume than zone (23) in order to provide constantly an excess of fresh moist steam of increased turbulence surrounding the fabric at the entrance, i e, at the point of strongest reaction. If, for example, five times the steam volume is necessary to reduce the reaction temperature, the volume of zone (23) will accordingly be one fifth of that of zone (24).

Other modifications comprise an opening in the upper part of the partition; introduction of the fabric takes place at the lower part of the ager. Still another modification comprises adding a third chamber to this device.

References cited by the Patent Office:

U S Pat 2,445,504 (Williams/1948): covers the dyeing (or fluid-treating) process in Williams Units. This is characterized by passing a pigment-impregnated or otherwise colored fabric through a developing unit where the treating fluid follows the material through a narrow channel in an even manner, thereby reducing bleeding to a minimum.

U S Pat 2,396,908 (Riverside and Dan River Co/1946): covers a continuous vat dyeing process comprising impregnating with a nonthickened pigment suspension, squeezing, drying and immediately subjecting the dried fabrics to an alkaline reducing treatment.

U S Pat 1,913,615 (Rupp/1933): covers a method of aging vat-printed fabrics by passing them through atmosphere of air-free steam, withdrawing part of the steam during operation and replacing it with fresh steam to keep the steam temperature constant.

U S Pat 1,403,990 (Turner-Fourneaux/1922): protects claims on an ager where the gases and vapors are exhausted by ventilating devices, providing suction elements between the folds of the fabric. In other constructions these vapors are drawn mainly from the edges of the goods.

Brit P 457,952 (Horridge): protects claims on an ager provided with a steam chest at the top of the machine. The duct is divided into two chambers, each connected with another part of the ager, whereby steam of different temperatures can be supplied to different parts of the cloth; the direction of the steam can also be reversed in different sections.

ABSTRACTS

Enzyme Action in Desizing

H Appleyard, *Dyer* 109, 685-7, May 15, 1953.

The enzymes are amylases; made from malt, from bacterial cultures, and from the pancreatic glands of animals. They produce soluble starches, dextrines and sugars, and destroy the binding power of the starch for any china clay which may be present.

There are two main requirements expected of the enzymes:

(1) The breakdown of 80-90 per cent of the starch with comparatively small amounts of enzyme. This applies chiefly to cottons. These are commonly kier-boiled twice with alkali after they have had an enzyme treatment and have been washed with cold water. If the bulk of the size has been removed, the kier boils can deal with the remainder.

(2) The breakdown of 100 per cent of the starch. This is wanted when preparing spun viscose cloths for crease-resistant finishes. It is not uncommon for a finisher to handle cloths of the same construction from several manufacturers, and each maker has used different quantities and qualities of size. Whether heavily or lightly sized, all the cloths have to have the same handle when finished. The only way to achieve this is to get very close to 100 per cent desizing. Even if only a little size is left, the cloth may have a crisper handle and a poorer crease recovery than the perfectly desized material. Unfortunately, the conversion of the last 20 per cent, and especially of the last 5 per cent of the size, is a much more difficult matter than of the first 80 per cent. Enzyme processes tend to stop before completion in the presence of the products they have already formed. A circulation method, using 3-6 volumes of liquid to the cloth, has an advantage over a piling method, as in the former case the degradation products are diluted by the extra volume of liquid. The circulation method also has the advantage of temperature control. The logical way out of the difficulty is to desize twice, but this is not often practicable.

In many works, desizing is done by running the cloth through a hot solution of enzyme and then piling it for a length of time. The temperature in the pile of cloth is the important one, not the temperature of the solution.

The enzymes are basic in their reactions; cotton behaves like a very mild acid, and viscose is more acidic. These acid groups in the viscose molecule do not alter the pH of the solution, but they do withdraw enzymes from the solution. For this reason, some people use calcium acetate either in the enzyme solution or

before it, in order to form the calcium salts of the viscose acid groups.

A useful buffer when dealing with acid cloths is sodium bicarbonate, which gives a maximum pH of 8.4. This is high for desizing, but not for bath stability, and the acid cloth passing through it comes out in the useful pH range of 6-7.5. Sodium acetate is also a useful buffering agent against acid; its pH is about 7.5. The ideal pH values for the different types of amylases in the presence of cotton are 7-7.5 for pancreatic; 6.7 for malt; and 6.2-6.8 for bacterial types.

The author gives the practical details of the desizing operation at considerable length.—WHC.

Vat Dye Oxidation: Review of Methods and Reagents

Anon, *British Rayon & Silk J* 30, 54, 56-7, June, 1953.

The oxidation of vat dyes after printing or dyeing has for its object the regeneration of the original vat color which has been solubilized by means of a reducing agent and alkali.

In the bichromate method of oxidation both potassium and sodium bichromate are used, preferably the latter because of its greater solubility and cheapness. The bichromates are used in acid solution, usually acetic, but where possible, with a pretreatment of the goods with weak mineral acid to neutralize alkali and destroy remaining traces of reducing agent.

Where heavy prints are being processed in slack rope form either by roller washers or elliptical winches, there is considerable risk of the goods in the reduced soluble state marking-off onto the unprinted parts of the pieces, if a strong and vigorous oxidation is not given as soon as the prints enter the liquor. Addition of the necessary amount of acid to the oxidizing bath should be made at regular intervals or continuously, so as to ensure maintenance of the pH value of the liquor at 3 or thereabouts. Oxidation in the open width prior to soaping in rope form may also be used to good advantage.

Bichromate oxidation is not very suitable for colors that are easily overoxidized, such as certain of the vat blues which turn dull and greenish on overoxidation. Some vat indigoid scarlets are also liable to dull on overoxidation. When this has occurred on vat blues, it is well known that a mild cold reducing treatment with sodium hydrosulfite followed by a thorough soaping at the boil will restore such blues to their normal reddish tone. An even milder and more stable type of reduction for this purpose is glucose added to the soaping liquors with a small amount of soda ash. Incidentally, where dyed vat blues have turned greenish in bleaching (shirtings, towellings, etc) the same treatment is recommended.

Peroxide in various forms is widely used in the oxidation of vat colors after dyeing and printing. Sodium and hydrogen peroxides, sodium percarbonate, ammonium persulfate, and ammonium percarbonate are all used to some extent, the most commonly used being perhaps hydrogen peroxide and sodium percarbonate.

Peroxides are especially useful in the oxidation of vat prints in light patterns such as are used for handkerchiefs and light-weight children's dress goods. The main point here is to keep the white grounds clean, and this is more easily done with peroxide oxidation than with bichromate. With peroxides the wash liquors keep clean for much longer periods, and the detergent action is much more efficient. The time saved during washing is also significant.

Sodium chlorite is recommended for use as oxidizing agent for vat dyes in dyeing principally on account of its easy rinsibility and noninterference with subsequent soaping treatments. Chlorite may be used alone, but a more vigorous oxidation is obtained either with acetic acid or sodium bicarbonate.

From the point of view of the evolution of chlorine dioxide which is both injurious to health and corrosive towards metals, it is best to maintain the pH value slightly alkaline rather than on the acid side. The temperature should be kept about 140° F.

In processing screen prints, since up to three times the amount of print paste is applied compared with roller printing, very vigorous oxidation with bichromate is necessary, and sometimes a subsequent desizing treatment is required to remove residual print paste.

Finally, it is well known that printed goods in the reduced state after aging should be oxidized as soon as possible, to prevent overheating and over-reduction of some of the dyestuffs.—WHC.

Fluorescent Dyes and the Application of Fluorescence to Textiles

T T Baker, *J Soc Dyers Colourists* 69, 109-12, April, 1953.

Fluorescence and phosphorescence have been studied for many years on an extensive scale. They are usually distinguished by the long afterglow of a phosphorescent substance after irradiation has ceased, while a fluorescent substance appears to cease glowing as soon as the exciting radiation is cut off.

The dyes which show fluorescence to a marked degree are derived from a limited number of classes. The xanthene group includes rhodamine and fluorescein, and the azine group safranine and Magdala red, while the acridine group provides acridine yellow and orange, trypaflavine, homophosphine, etc. The 4-amino-1.8-naphthalimides, e g, Brilliant Sulfoflavine, the thiazole dye Thioflavine T, the anthraquinone dye Duranol Brilliant Yellow 6G, Auramine G, and many Indigosol and Soledon dyes also show bright fluorescence. But there are no instances of fluorescence among the large number of azo dyes, except in rigid solvents (e g, when adsorbed on textile fibers).

The appearance a few years ago of advertisements and posters in very bright colors, due to the use of a small number of fluorescent dyes, caused considerable interest, although fluorescent dyes have been known for many years. The essential feature of a fluorescent substance is that, when suitably presented, it is capable of re-emitting a part of the radiant energy it absorbs as visible radiation, thereby increasing the apparent brightness of the color.

The essential feature of the Day-Glo process evolved by the Switzer Brothers for the manufacture of poster colors is the initial formation of an approximately 2.5 per cent solution of the dye in a thermosetting resin such as urea- or melamine-formaldehyde. The efficiency is very dependent on the pH. In the cured resin, the dyes may be regarded as being in solid solution, in a form in which fluorescence yield is at a maximum.

The particle dispersion must be such that the particles are not tightly compressed together, as in an ordinary printing ink, but are separated so that the light striking the surface can penetrate to the white reflecting surface on which the print is made, and can be reflected back again through the film of ink. In this way each tiny particle acts as a luminous fluorescent source, and maximum brightness is apparent.

The Switzers contend that by forming a solid solution of certain dyes within the fibers of a fabric, brilliant colors can be obtained which fluoresce in daylight. To obtain the most brilliant fluorescence in daylight with cellulose acetate fabric, not more than 0.025 g of a dye reflecting yellow-green light is dispersed in each cc of fabric filament, while the corresponding figure for dyes reflecting red light is 0.015 g/cc. This apparent anomaly in the optimum mass of dye per unit volume holds good for all the daylight-fluorescent pigments, as well as dispersions, according to the various Switzer patents.

The ideal method of printing on textiles is the silk-screen process, using stencils made on a comparatively coarse-mesh silk such as 6XX or 8XX.

The Switzers' early work was largely

in connection with signalling devices for military purposes, and Day-Glo played an important part towards the end of World War II. Ground signals can be seen distinctly at up to four times as great a distance as signs in ordinary colors.

It is generally known that high fluorescence goes hand in hand with rapid fading, and Day-Glo posters are not expected to last more than six weeks in summer sunshine.

The author also refers to the large and growing patent literature relating to colorless organic dyes which brighten white textiles and papers by adding blue fluorescent light.

The use of fluorescent dyes in locating flaws in metals is also described.—WHC.

Mothproofing Methods and Tests

J Barritt, *Dyer* 109, 905-10, June 26, 1953.

The damage which can be done to wool textiles by moth larvae has been recognized since earliest times, and attempts have been made through the ages to prevent it. Today it can be truly said that wool can be completely protected against larval attack if this is desired.

Materials which must be mothproofed include those which go into industrial uses where breakdown of the wool would impair the functioning of the equipment; also materials with a long life (e g, carpets, blankets, furs, etc). Materials used continuously do not need to be mothproofed unless they are to be stored.

It has been estimated that in the U S alone the damage from moths and carpet beetles amounts annually to over $200,000,000.

The most common pests in England and America are the clothes moth, *Tineola bisselliella*, and the black carpet beetle, *Attagenus piceus*. Methods of protection include the following:

(a) Spraying or dusting of the wool and storage places periodically with an insecticide. Sprays are often based on pyrethrum, fortified by DDT. Dusts contain either DDT or Gammexane.

(b) Storage in a closed chamber with a volatile insecticide. The substances most used in the past have been naphthalene and paradichlorobenzene. Fumigation with hydrogen cyanide is very good for a "once for all" treatment.

(c) Addition to the wool of a substance that makes it immune to attack. The ideal mothproofing agent is one which can be applied easily, has no deleterious action, is effective throughout the life of the material, and is not expensive. The various compounds used in recent years include Eulan Extra (a double fluoride of aluminum and ammonia) and other similar products; Eulan N, a colorless triphenylmethane dye heavily substituted by chlorine, followed by other Eulan brands and Lanoc CN, all of similar nature; and Mitin FF, a substituted urea, also highly chlorinated. Other mothproofing agents which are used are pentachlorophenol and DDT. The latter is very cheap and extremely potent; only 0.1 per cent on the weight of wool is sufficient to protect it.

The author gives figures showing the relative fastness to washing of some of the proofing agents, and also describes briefly the standard methods of testing mothproofed materials in England and on the Continent.

It is now possible to modify wool chemically so that it will resist breakdown by the larval digestive system, but it is not yet a practical proposition, according to the author.—WHC.

Flammability Hazards of Fabrics

J M Church, *Chem Eng News* 31, 325-9, January 26, 1953.

The factors contributing to the flammability of fabrics are three in number: 1) the nature of the basic fiber or fibers, 2) the construction of the fabric, and 3) the added materials used in the finishing of the fabric. Since practically all textile fibers are organic in nature, and all organic compounds in general are capable of combustion, it follows that inherently most fabrics are flammable to at least a certain degree. When heat in the form of a flame or igniting source is applied to the fabric, the organic fibers decompose and, in most instances, liberate decomposition products, which, being highly combustible, burst into flame. The carbon char remaining is subject to a flameless combustion resulting from a slow oxidation of the char, and may be noted by the glowing action, which consumes it and liberates additional heat much more intense than that of the flame.

The most common of the textile fibers are those of cellulose, displaying characteristics of the above phenomena. Other fibers of similar composition, containing carbon, oxygen and hydrogen, behave in much the same way, although the initial temperature of ignition may be different and the amount of oxygen required for the combustion may vary. If heated enough in the presence of sufficient air, all of the fibers of this type will burn and sustain their own combustion. However, fibers of a different chemical composition may possess flammability characteristics quite distinct from those of cellulose.

Among the natural fibers, those of wool and silk, which are of a protein structure containing amino groups, decompose less rapidly and evolve decomposition products that are less flammable. The same is true of some of the new synthetic fibers of the amino type, such as nylon. Another synthetic fiber, containing chlorine in part of its structure, is likewise of the less flammable type because of its greater thermal stability and less combustible decomposition products. One of the more recent of the synthetic fibers, polyacrylonitrile, which is somewhat related to the polyamide fibers in that it also contains nitrogen, is of equal flammability to that of cellulose. This is also true of the polyester-type fibers closely related to cellulose in chemical composition.

Another fiber characteristic related to flammability is the physical character. Most of the natural fibers are somewhat irregular in shape and the assembled fibers in the yarn present a non-uniform surface. In contrast, the synthetic and modified natural fibers are quite uniform and represent smooth monofilaments of fairly definite size and form. Since initial combustion of a solid material is a surface reaction, the more irregular fibers offer a greater surface area and a higher air-solid ratio, and therefore are somewhat more easily ignited. This effect is much more pronounced in fabric construction where loose fibers and filaments are exposed on the surface of the fabric.

In the construction of the fabric, there are many variations in the size and twist of the yarn, the weave pattern, and the weight or density of the fabric, which result in a more or less readily combustible fabric independent of the type of fiber from which it is made. Even a comparably nonflammable fiber, such as wool, can be ignited and will sustain a flame fairly easily when in the form of a loosely woven fabric.

An additional factor that may contribute to the flammability of fabrics is the finish. Added to the fibers in the preparation of a fabric are many substances which in themselves may be more combustible than the fiber, or may influence the rate of combustion of the fiber.

The problem of reducing the combustibility of cellulose fabrics as well as other cellulosic materials has been studied intensively for many years, and several solutions, i e, fire-retardant treatment, have been suggested. All of these methods involve one of two basic principles: 1) limiting the air supply, thus decreasing the rate of combustion, or 2) directing the initial breakdown of the cellulose so as to produce a lesser amount of combustible decomposition products.

The durable fire-resistant treatments, which are the only ones of any practical significance, may be classified into three categories: 1) pigment type, consisting of insoluble retardants impregnated or precipitated within the fabric structure, 2)

resinous materials added in soluble form and fixed within the fabric structure by polymerization through a heat cure, and 3) retardants chemically attached through a partial reaction with the fiber substances, usually employing a heat treatment. Many commercial flame-resistant treatments for cellulosic fabrics have been devised, embodying the principles of one of these basic treatments.

A table is included listing several of the more important flameproofing compounds currently being offered, together with their methods of application, advantages, and disadvantages.

As pointed out above, many of the newer fabrics made from synthetic fibers or modifications of cellulose have a flammability equal to those made from cellulose. Attempts have been made to utilize those fire retardants found effective on cellulose fabrics for the fire-resistant treatment of the synthetic fabrics. Unfortunately, not many of these have proved very effective in limiting the combustibility of the synthetic fibers. It is hoped that the scientists of our chemical and textile companies (foremost, in synthetic fiber development) will be more concerned about this problem. They should not be content to disregard it and wait for that eventual day when they will be compelled by legislation or competition to produce a less combustible fiber or fabric.—WHC.

Dye Saturation and Dye Compatibility

J A Somers, *British Rayon & Silk J* 29, 58-62, January, 1953.

The present use of synthetic fibers, such as nylon, Terylene, and Orlon, has brought to a climax something which began with the introduction of acetate rayon: it is now necessary more than ever to exercise care in the selection of the members of any dye mixture, for in the dyeing of these newer fibers it can no longer be assumed that the behavior of any one of the dyes is quite independent of the presence in the dye liquor of the other dyes. For example, when nylon is dyed with 0.25 per cent each of Anthraquinone Blue SKY and Quinoline Yellow Conc, there results a yellow-green shade, but if the amounts of these dyes are increased to 1.0 per cent each, then the resulting shade is a very blue-green.

The introduction of acetate rayon brought new ideas about the way in which dyes could be absorbed. Previously, cotton dyes were considered to become adsorbed on the internal surface of cotton and viscose rayon fibers; the dye particles pass into the fibers by way of the comparatively large spaces which separate the long cellulose molecules, and then become deposited on the surface of these molecules so that they cannot easily be removed. By contrast, acid wool dyes become fixed within wool fibers by chemical combination with the basic groups known to be present as part of the long keratin molecules which constitute wool fibers. In the case of dyeing acetate rayon, measurements of dye absorption by this fiber have suggested that dye absorption is a matter of the dye dissolving in the solid cellulose acetate.

In recent years this solution theory applying to the dyeing of acetate and synthetic fibers has received common acceptance. It applies only to the water-insoluble dyes which are generally termed "acetate rayon dyes," or more specifically, "dispersed acetate rayon dyes."

The dyeing of synthetic fibers with acid wool dyes brings into consideration both dye saturation and dye compatibility as important features of the dyeing process. It will be better to deal more particularly with nylon, although the principles involved apply also to the dyeing of other synthetic fibers.

Nylon can be dyed with acid wool dyes (the direct cotton dyes behave similarly) to give shades which are technically important. But in applying them in the usual way (as for wool) it is found that they lack the affinity which enables them to be absorbed sufficiently to give deep shades. Investigations have shown that the average relative affinities of these dyes for wool, silk, and nylon are in the order 60:12:3, but of course the individual dyes differ considerably among themselves.

Since nylon fibers are built up of long-chain molecules of poly-hexamethylene adipamide which have terminal amino (NH_2) and carboxyl (COOH) groups, it is generally believed that the colored dye anions first adsorbed become located on the amino groups in the same way that these dyes become attached to the basic groups in wool. Acid dyes thus dye both nylon and wool by a process of chemical combination. The number of terminal amino groups in nylon is comparatively small, and this explains the relatively small absorption of dye as compared with that shown by wool.

However, nylon long-chain molecules also contain numerous amide (CO-NH) groups. It is believed that in neutral or moderately acid conditions of dyeing these amide groups remain fairly inactive toward acid wool dyes. But if the acidity of the dye bath is increased so that the dye liquor has a pH of about 3, then these amido groups play a part in dye absorption, constituting new dyeing sites. By this method, deeper shades can be produced. The resulting shades also have a higher degree of fastness to light and washing.

The poor affinity of nylon for acid and direct dyes may be considered from two other angles—there are possibilities of improving it, and also of making use of it in the production of two-colored effects.

The affinity can be improved by adding to the dyebath an agent capable of swelling the nylon fibers. Such swelling would be expected to separate laterally the long-chain molecules so that the amide groups would be able to function as dyeing sites.

On the other hand, to reduce still further the affinity of nylon for acid and direct dyes, it has been suggested (B P 552,-015) that the fiber be pretreated with certain "colorless dyes" (e g, H-acid) which are absorbed so strongly that when suitable acid dyes are subsequently applied, they are not absorbed at all. If this process is used on wool-nylon mixtures, it is claimed that the wool can be dyed and the nylon left white.—WHC.

Aqueous Dyeing of Orlon and Dacron

W G Rhoads, *Modern Textiles* 34, 57-8, February, 1953.

(Presented at Du Pont Conference)

The dyer today colors "Orlon" acrylic fiber and "Dacron" polyester fiber in conventional equipment, in jigs, becks, and circulating machines. On staple or continuous filament "Dacron" he can offer a full line of shades having outstanding wash- and light-fastness, using acetate dyes. On "Orlon" staple he can offer a range of shades having good light- and wash-fastness, using selected acid dyes applied by the cuprous ion method. Selected basic and vat colors may also be used.

In dyeing these new fibers, the dyer can benefit by using pressurized equipment at temperatures above the boil to get better results with the expenditure of less time and money. The advantages of dyeing at high temperatures are as follows:

"Orlon" Acrylic Fiber

1. No carriers needed for heavy shades
2. Wider selection of reducing agents
3. Basic colors have better fastness and solidity of shade
4. Wider selection of dyes

"Dacron" Polyester Fiber

1. Shorter dyeing times
2. Better wash- and crock-fastness on filament fabrics
3. Better uniformity on continuous filament fabrics
4. No carriers needed

Machinery for dyeing at temperatures above the boil is available today for stock and package dyeing, also for knit goods, and will be available soon for piece goods.

When dyeing "Orlon" by the cuprous ion method at temperatures below the boil, hydroxylamine sulfate is the best available reducing agent. This chemical is easily oxidized, and while only about 1 per cent on the weight of the goods is necessary to reduce the cupric ion to the cuprous form, up to 4 per cent may have

to be used to replace that oxidized by the air. In addition to hydroxylamine sulfate, three other reducing agents—furfural, glyoxal, and sodium bisulfite—can be used for high temperature dyeing.

Dyeing times for "Dacron" have been excessive at normal temperatures, especially for filament fabrics on the jig. Also penetration is sometimes poor, particularly in heavy shades. This causes poor wash- and crock-fastness. At high temperatures, however, it is found that penetration is complete in one hour, better fastness properties are obtained, levelness is improved, and carriers are not needed.

The author warns that high-temperature dyeing requires pressure equipment which is potentially dangerous; a few dyestuffs are unstable at these temperatures and must be avoided; and shrinkage of the fabrics is greater.—WHC.

Textiles and Rubber

J W Illingworth, *British Rayon & Silk J* 29, 57, January, 1953.

One of the most important features in making vehicle tires is the question of adhesion of the rubber to the textile tire cord. With cotton this adhesion is good, but it is not so good with rayon staple, although the latter is better than rayon continuous filament.

To aid bonding of the textile and rubber, dip pretreatments of the textile cords are applied, these being of three general types. One method uses a latex-casein mixture, another resorcinol - formaldehyde plus latex, and a third uses isocyanate. Of these the first two are satisfactory for viscose rayon tire material. The adhesion is less easy with nylon and Perlon and especially Terylene, which has only about a 0.5 per cent uptake of the dip mixture.

Heat curing of tires takes place at about 130° C, and the textiles used must withstand this. A laboratory test consisting of exposure in an oven at 100° C for 84 days shows both viscose and cotton to retain about 60-65 per cent strength after such exposure. In the tire the cord is exposed in use to hot dry conditions, and under these viscose gains and cotton loses strength relative to its tested strength under normal testing conditions (65 per cent R H).

Creep is another feature of textiles to be reckoned with in tires, particularly when using Perlon or nylon. It is not a problem with cotton or rayon.

Fatigue of textiles is also a significant property, and one which it is difficult to assess in laboratory tests. Results of indoor wheel testers where tires are run to destruction do not always tally with road tests. At one time cords were used with lower twists, and a great improvement was made in fatigue life when higher twist cords were introduced. High twist cords are reduced to low extensibility by stretching under exposure to moisture, either water or more usually steam.

Synthetic rubber tends to run hotter than natural. The use of rayon enables thinner ply to be used, compared with cotton, and this tends to keep the temperature nearer to that of an ordinary tire with cotton plies.—WHC.

A Dyer's Definition of the Term "Fast Dye"

J Fellows, *Canadian Textile J* 70, 58, January 16, 1953.

The word "fast" is described in the dictionary as meaning, besides other things, "permanent," "firmly fixed," and "durable."

When we speak of a fast dye, we mean, of course, a fast *dyeing*, this being a system of dyestuff and fiber, the merits of which will have been influenced by a third factor—the manner of application. A vat dye which may be fast to light and washing when properly dyed on cotton may not be so on nylon, and might even be poor on cotton if improperly applied.

Drapes and furnishing fabrics must be fast to light, and must not show much, if any, fading during a lifetime reasonable for the quality of the fabric. The better quality furnishings, drapes, and awnings (which, of course must withstand weathering also) should be dyed with selected anthraquinone-type vats, particularly in the pastel shades, where we should if possible select those dyes which rate at least 7 in a pale shade. The reds and wines ought to be dyed with azoic combinations specially selected for light fastness, while the blacks can be produced with excellent light fastness by using specially selected developed dyes or sulfur blacks.

Dress goods which are sold as *fast dyed* are very often those fabrics which require to be washed, as distinct from dry-cleaned, and we *must* provide dyeings such as will not bleed onto adjacent white and will not lose much, if any, in depth of color upon repeated washings at temperatures suitable for the type of fabric and garment. Reasonable light fastness should also be provided, and no dye which rates less than 5 to light and 4 to washing ought to be employed for dress fabrics, labeled fast dye. Cellulosic fibers require to be dyed with vats, sulfurs, or azoics, while chrome mordant or premetallized dyes should be employed on wool.

Where costs or equipment do not allow the use of vats, direct dyes after treated with the modern copper-resin salts, or diazotized and developed, are in many cases permissible if dyeing is followed by a really vigorous soaping. The copper-resin type of after-treatment gives rather better wash and light fastness than diazotizing and developing, but requires more care to secure accurate reproduction of shades.—WHC.

Garment Dyeing

J K Collins, *Dyer* 109, 243-5, February 20, 1953.

The bulk of the garment dyer's work is the dyeing of garments consisting mainly of wool, with cotton present sometimes in admixture with the wool but more often in the form of stitching. Linings may be composed of viscose, acetate, or mixtures of these two fibers.

Dyeing may be carried out by either (a) the one-bath method, in which both fibers are dyed simultaneously from a neutral bath, or (b) the two-bath method, in which the wool is dyed first from an acid bath and the cotton filled in, in a fresh bath. Full directions are given for both methods.

Cotton, linen, and viscose articles may be in the form of curtains, bedspreads, furnishings, and garments. It is recommended that these be dyed as a separate class with fast-to-light dyes.

Many ladies' dresses made from spun viscose, and similar in appearance to linen, appear to resist the dye, and this is usually due to the presence of a crease-resist finish. It is necessary to remove this before dyeing can take place, by treating the garment for ¾ to 1 hour at 80-90° C in a bath containing ½ pint of sulfuric acid or 1½ pints of formic acid per 10 gallons of water, after which it is well rinsed in water, neutralized with soda ash, and again rinsed prior to dyeing. During the treatment, formaldehyde, recognized by its smell, is liberated.

Garments made from high-tenacity rayons may be met occasionally. These have high wet and dry strength, but it is impossible to dye them to heavy shades. They should not be confused with anti-crease-treated fabrics.

Acetate rayon fabrics are generally dyed with dispersed acetate dyes. Full particulars are given for applying this group, which is also recommended for nylon. Silk dyeing is also discussed briefly, as well as the dyeing of unions of various fibers.

For stripping, when necessary, the author recommends the sulfoxylate-formaldehyde type of stripper for wool goods, and hydrosulfite for cotton and viscose fabrics. He closes with a few suggestions for applying waterproofing agents and stiffeners.—WHC .

NEWS

• New Berkshire Facilities Completed

A new building, housing laboratories and administrative facilities, has been completed and occupied at Delawanna (Clifton), N J by Berkshire Color and Chemical Company, it is announced.

Providing for considerably larger laboratory space, the new structure makes possible the expansion of Berkshire's research and testing in all phases of dyeing, in all fabrics and fibers.

According to Elmer Warshaw, president, the new facilities will enable the Company to expand considerably its present program of offering the services of its laboratory and staff to provide technical assistance to textile firms.

Exterior of Berkshire Color and Chemical Company's new building to house laboratories and administrative offices.

A view of Berkshire's new laboratory.

• Westvaco Reorganizes

The reorganization of Westvaco Chemical Division, Food Machinery and Chemical Corporation, New York, into two separate operating divisions took effect on January 1st. The new divisions are to be known respectively as Westvaco Chlor-Alkali Division, Food Machinery and Chemical Corporation, and Westvaco Mineral Products Division, Food Machinery and Chemical Corporation.

Westvaco Mineral Products Division will be responsible for products manufactured at Carteret, N J, Lawrence and Sunflower, Kans, Modesto and Newark, Calif, and Pocatello, Ida, plants which include phosphorus, phosphates, barium chemicals and magnesium chemicals. W N Williams, Westvaco's operating vice president, has been named president of this new division.

Westvaco Chlor-Alkali Division will be responsible for products manufactured at the Charleston, W Va and Green River, Wyo plants, which include chlorine, caustic soda, soda ash, chlorinated chemicals and carbon bisulfide. Franklin Farley of the administrative staff, FMC Chemical Divisions and previously a Vice President of the International Minerals and chemical Corporation, has been appointed president of this division.

Both Mr Farley and Mr Williams will report direct to Ernest Hart, executive vice president, Chemical Divisions, Food Machinery and Chemical Corporation. Sales and service groups as now constituted will continue contacts with customers on all products.

• International Detergent Congress

Members of the trade association "Chambre Syndicale Tramagras", manufacturers of synthetic detergents, are sponsoring a world-wide congress on detergents to compare various techniques, study the numerous applications and future outlets, and examine the economic consequences of this evolution. The congress will meet for the week of August 30th to September 5th, 1954, at the Sorbonne in Paris and will be presided over by Professor Trefouel, Director of the Pasteur Institute. The following tentative program is under consideration:

Scientific ——— physico-chemistry of surface-active compounds: capillary activity, emulsifying, detergent, foaming, dispersing and antifroth properties; analysis and identification; test methods.

Technical ——— production: equipment materials of construction, raw materials, methods.

Applications ——— application in all industries, including the textile, will be considered.

Economics.

Suggestions concerning the program and applications for presentation of papers should be sent to the Director of Chambre Syndicale Tramagras, H Butré, 70, Champs-Elysées, Paris 8, France.

• Symposia on Textile Technology

The Canadian Association of Textile Colourists and Chemists (Quebec Section) will inaugurate a series of four symposia on textile technology, one a month during the first four months of this year. If the effort is successful, it will become an annual event.

The 1954 series will be concerned with various aspects of high polymers as they are related to textile fibers. All meetings will be held at Ciba Company's Conference Room 1235, McGill College Ave, Montreal at 7 P M on the Friday immediately before regular monthly meetings of the Section.

The schedule follows:

January 15—"Cellulose Chemistry"—Harold M Spurling, Hercules Powder Co

February 19—"High Polymer Chemistry"—R V V Nicholls, McGill University

March 18—"Practical Applications of X-Ray Photography"—J A Howsman, American Viscose Corp.

April 9—"Future Trends in Synthetic Fibers"—H F Mark, Polytechnic Institute of Brooklyn.

• Givaudan-Delawanna Relocates Atlanta Office

The Atlanta, Georgia office of Givaudan-Delawanna, Inc, and its associate companies, Givaudan Flavors Inc, and Sindar Corporation, has been moved to larger quarters at 1156 Dalon Drive, N E. The telephone number at this new address will be ATwood 0122.

• Brouillard Addresses N Y Pigment Club

The New York Pigment Club met on December 10th to hear Robert E Brouillard, supervisor in charge of research and development of dyes and pigments at the Grasselli plant, General Aniline & Film Corp, speak on "The Chemistry of Phthalocyanines".

Dr Brouillard discussed the discovery and commercial exploitation of pigments that are relatively new to the chemical industry.

• Sarco Sales Office in San Francisco

A new sales office at 35 Elmira Street, San Francisco is exclusively representing Sarco Company, Inc, manufacturers of steam traps, temperature regulators and heating specialties, in Northern California. The office has been established since October 15, 1953.

J S Spear, sales manager of the new office, has been associated with the firm for over 15 years, serving as sales manager in the New York territory.

NOTE

Attention is called to the advertisement of a high-temperature dyeing machine manufactured by Teinturerie de Groeninghe, Machine Building Division, which appears on page 31A of this issue. The price of the unit is $1200, cif New York or Boston.

In a similar advertisement that appeared on page 92A of the December 7, 1953 issue, the price was incorrectly listed as $600.

• "Tetrine" Trade Mark Granted Glyco

The trade-mark "Tetrine" has been granted by the U S Patent Office to the Glyco Products Co, Inc, Brooklyn, N Y, covering ethylenediamine tetraacetic acid and its salts as sequestering, chelating and complexing agents.

The "Tetrines" are used industrially to bind and "remove" polyvalent interfering ions, such as iron, calcium, magnesium, copper, chromium, zinc, manganese, etc.

• 4th Alumni Conclave, NCSC School of Textiles

A comprehensive technical program in conjunction with the usual social program highlighted the fourth annual Alumni Conclave in the School of Textiles at North Carolina State College recently.

The following papers were presented: "An Engineering Survey of Cotton in the Canvas-Awning Industry" ——— G Dent Mangum, NCSC; "Mercerization and the Luster of Cotton"———Arnold Sookne, Harris Research Labs; "Quality Control in Spinning and Weaving"———A G Clock, Bigelow-Sanford Carpet Co; "Employee Motivation" ——— William McGehee, Fieldcrest Mills; and "Solution-Dyed Staple Fiber" ——— William Bowman, Textile Research Dept, American Viscose Corp.

• Hooker Begins Shipments of Liquid Caustic Soda and Chlorine

Hooker Electrochemical Company began shipping liquid caustic soda and liquid chlorine from its new plant at Montague, Michigan on January 1.

Standard grade liquid caustic soda in 50% and 73% strength is available by tank car as well as barge shipments of 50% from Montague. Standard grade, 50% caustic soda is also available in tank cars from Hooker's storage facilities at Lake-River Terminal in Chicago. No solid or flake caustic is manufactured. Chlorine is available in single unit tank cars of 30 or 55 tons. No provision is being made for cylinders or ton containers.

• Plant Maintenance & Engineering Show

Maintenance problems in the textile field will get special attention at the forthcoming Plant Maintenance & Engineering Show and Conference in Chicago.

The exposition will take place January 25-28 at the International Amphitheatre; the conference will be held at the Hotel Conrad Hilton. Two round-table conference sessions have been set aside for exclusive consideration of textile problems.

Fifty-nine conference sessions are scheduled. Among those of special interest to the textile field are "Planning and Scheduling Maintenance Work," "Maintenance Cost Control and Budgeting," "Preventive Maintenace," "Training People for Maintenance Work," "Organizing People, Policies and Procedures for Effective Maintenance," "Sanitation," "Work Measurement, Work Standards and Incentives," "Getting Management's Okay on the Maintenance Program," "Maintenance Labor," "Corrosion," "Hospitals, Medical Departments and First Aid Rooms," "Card Records and Analysis Systems," and "Waste Disposal."

Particular types of equipment used in the textile industry will get special attention at separate sessions. These include materials handling, mechanical services, lighting, power plant and electronic control equipment. Others include "Electrical Distribution Systems," "Methods of Handling in Maintenance Work," "Lubrication," "Stores and Storekeeping," "Maintenance in Plants Having Up to 25 Employees," "Plant Buildings" and "Janitor Work."

Full information may be obtained from Clapp & Poliak, Inc, 341 Madison Ave, New York 17, N Y.

• Honeywell Sets Training Courses Schedule

Schedules for industrial instruments' maintenance and repair courses for the first half of 1954 at Minneapolis-Honeywell Regulator Company's Philadelphia training school have been announced by the company's Industrial Division.

The Division has again listed a 14-week's comprehensive class, which it offered for the first time last year to include instruction in new devices. Other Honeywell customers' courses include two five-week's sessions and several running up to three weeks. A large early enrollment appears to indicate an increasing industry interest in the courses, now in their 18th year.

The 14-week course will be held from Feb 15 to May 21. The two five-week's courses will start Jan 4 and April 26. Shorter courses will start Feb 15, March 8, April 5, and June 7.

Principals at Meeting of Alpha Active and Philadelphia Alumni Chapters of Delta Kappa Phi Fraternity

(L to r): E Paul Schwarze, Sauquoit Silk Co, consul of Alpha Alumni; A Ward France, PTI, supreme consul; Collins Thompson, Jr, Du Pont, guest speaker; Henry J Rotters, Artloom Carpet Co, annotator of Alpha Alumni; Charles D Bean, Mercer Yarn Co, pro-consul of Alpha Alumni.

• ΔKΦ Alumni Chapter Formed in Charlotte

Delta Kappa Phi Fraternity, reputedly the oldest textile fraternity in the country with over 2000 members, has formed an alumni chapter in Charlotte, N C. It will be known as the Kappa Alumni Chapter. All members in the area are invited to contact Harold E Meunier, 2020 Lombardy Circle, Charlotte 3, N C.

The fraternity's Alpha Active Chapter and Philadelphia Alumni Chapter held a joint meeting recently in Philadelphia to hear Collins Thompson, Jr., assistant manager of the Fabric Development Group, Textile Fibers Dept, E I du Pont de Nemours & Co, Inc speak on "The Progress of Textured Yarns in the Development of Man-Made Fabrics."

The Fraternity was organized in 1899 at the Philadelphia Textile Institute. Other active chapters are at Lowell Tech, New Bedford ITT, North Carolina State College and Georgia Tech. Its present national officers are: *supreme consul*—A Ward France, PTI; *supreme pro-consul*—Henry Rutherford, North Carolina State College; *supreme Annotator*—Clifford M Gilpin, Jr, Downs Carpet Co; and *supreme custodian*—Stanley Pikalow, Jr, Belltex Mills.

• Rohm & Haas Reduces Prices of Sodium Hydrosulfite

A reduction of a cent and a half a pound in the price of its concentrated sodium hydrosulfite has been announced by Rohm & Haas Company. Reduced prices are twenty-three cents a pound in carload and truckload lots (single shipment minimum, carload 37,500 lbs net, truckload 22,000 lbs net), twenty-three and a half cents per pound in 250 pound drums (less than truckload lots).

A leading producer of sodium hydrosulfite, Rohm & Haas markets its products under the trade name Lykopon.

• New Apparel Fabric Contains Ramie

In co-operation with Newport Industries, Boston, Mass, producers of ramie fiber, and the American Cyanamid Company's Textile Resin Department, Swift Manufacturing Co, Columbus, Ga has introduced a new apparel fabric containing ramie fiber produced on a commercial scale. The new Permel Plus resin-finished fabric is said to possess a unique combination of qualities including extraordinary strength, wrinkle resistance, spot repellance, washability and economy.

Ramie, a textile fiber known to the ancients, is noted for its high dry and wet strength, fine dyeing qualities, absorbency, resistance to shrinkage, mildew resistance and high abrasion resistance. Recent discoveries of methods to separate and clean the ramie fiber have aided in making it commercially available at a competitive price.

At a recent showing at the Princeton Club in New York, the fabric (blend of ramie, cotton and viscose staple) was exhibited in several end uses.

Among the tests shown were a single ramie shoemaker's thread suspending a twelve pound weight, spot resistance of the fabric to tomato juice, grape juice, wine and Coca Cola, and evidence of wrinkle recovery.

The ramie fiber is grown on the plantations of Newport Industries near the Everglades in Florida. The plant reportedly grows to a height of between five to eight feet and grows so rapidly that at least three cuttings a year are possible. It is decorticated and processed near by, and then cleaned and cut into staple lengths. The fibers obtained from the stalks are said to be from eight to twenty inches long. For spinning into the Swift blended yarn, the fibers are cut into 2½" staple.

• Plans Set for PTI Mid-Winter Banquet

Robert C Jackson, executive vice president of the American Cotton Manufacturers Institute, Inc, Washington, D C, will be the principal speaker at the 53rd annual mid-winter banquet of the Alumni Association of the Philadelphia Textile Institute, it is learned. Mr Jackson, who has been Executive Vice President of the American Cotton Manufacturers Institute, Inc since 1949, has over twenty years experience in the cotton industry.

Alumni President Edward G Haack, General Dyestuff Corporation, will preside and Charles W Carvin, president of Charles W Carvin Company, New York, and an alumnus of PTI, class of 1923, will act as toastmaster. The affair will be held at 7:00 P M, Friday, February 5th, at the Warwick Hotel, 17th and Locust Streets, Philadelphia, Pa.

Reservations may be made by contacting Mrs E Selma Crane, secretary of the Alumni Board of Government, Alumni Office, Philadelphia Textile Institute, School House Lane and Henry Avenue, Germantown 44, Pa.

• Hercules Establishes Atlanta Sales Office

Hercules Powder Company has announced the establishment of a new sales office for their Synthetics Department in the Rhodes Haverty Building, 134 Peachtree Street, Atlanta, Ga, and the relocation of their New York sales office at 380 Madison Ave.

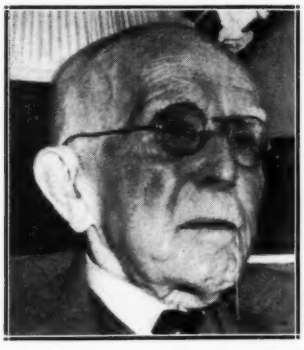
The new Atlanta synthetics sales office, located where two other Hercules departments presently maintain sales offices, will be a sub-office of the Wilmington District, of which John F Copeland is manager. Charles S Huhn will serve as technical sales representative, handling the department's products in Florida, Georgia, the Carolinas, most of Alabama, and part of Tennessee. Mr Huhn has occupied a similar position for the past seven years in the Wilmington, Delaware branch office of the Synthetics Department.

• Columbia International Corporation Formed

Harry Kaplan, formerly of Organic Intermediates, and Jesse Weiss, formerly of Elbert & Co, have formed the Columbia International Corp, with offices at 200 Terminal Road, Clark (Rahway), New Jersey. The phone number is Rahway 7-6937. The new organization is offering trichlorethylene and other chlorinated solvents, a full line of metal-finishing equipment and supplies, industrial solvents and chemicals, fine chemicals and specialty intermediates.

NAMES IN THE NEWS

E C Lenz



W P Atwood

G N Nickles

EARL C LENZ, formerly vice president and general sales manager of Paisley Products, Inc, subsidiary of Morningstar, Nicol, Inc, has been elected vice president of sales and advertising for the parent company and all its subsidiaries.

The new sales headquarters of Mr Lenz will be located at the firm's executive offices in New York. He has been with the Paisley division for 21 years.

Morningstar, Nicol operates three Paisley industrial adhesive plants in New York, Chicago and St Louis. Starch, dextrine and water-soluble gum plants are located at Houlton, Me, Hawthorne and Jersey City, N J. The combined sales staff now headed by Mr Lenz numbers over 60.

ALLIED CHEMICAL & DYE CORPORATION has named LEON W SEIGLE and FRED B JOHNSON as manager and assistant manager, respectively, Intermediate Sales, National Aniline Division. They will make their headquarters at the Company's Executive Offices at 40 Rector Street, New York.

Since joining the Company in 1939 Dr Seigle has served in the Research & Development Department as a research chemist and later as a section leader. During an interim period he was attached to the Port Chester Laboratory of National's New Products Division. Dr Seigle will now have charge of the sales of intermediate chemicals for National as well as the addition of new intermediate products to the sales line.

Mr Johnson joined the Company in 1934 as a member of the Merchants Division. He was later transferred to Intermediate Sales at the Executive Offices of the Company and has served in that capacity for several years. His new duties will include, among other things, the coordination of production and sales of National's new intermediate chemical products.

WILLIAM PRESTON ATWOOD, a charter member of AATCC and the oldest living alumnus of the Massachusetts Institute of Technology, recently celebrated his 100th birthday anniversary.

Mr Atwood was born in Orrington, Maine, on October 27, 1853, his family moving to Lowell, Mass in 1864. Following his graduation from MIT in 1876, he entered upon his career in textile chemistry with the Hamilton Print Works of Lowell, which later became the Hamilton Manufacturing Company. In 1909 he joined the Massachusetts Cotton Mills as a chemist, where he evolved and perfected many dyeing techniques. He was consulted by dyestuff manufacturers throughout the country, particularly in the production of American dyestuffs upon the cessation of the hitherto exclusively produced German dyes. His experience covered problems in both the cotton and woolen manufacturing fields, as well as the earliest synthetic fibers. Upon his retirement in 1928, he was made an honorary life member of the American Chemical Society. He has been an active member of the William North Lodge of the Masonic Order of Lowell for 72 years. For the past 30 years he has been a member of the Alumni Council of MIT, his current elective term expiring in 1955.

Mr Atwood's "extra-curricula" interests include activities i the Appalachian Mountain Club, of which he is a charter member, botany, entomology, geology and astronomy. Until his 96th birthday he maintained a comprehensive vegetable and fruit garden in Chelmsford, Mass.

Married to Lola Cheney in 1895, Mr Atwood has a son, William F Atwood of Barnes Textile Associates (Boston) and a daughter, Catherine, director of the Bacteriological Laboratory, Health Dept, Boston. Mrs Atwood died in 1944 and, since 1951, Mr Atwood has made his home in Auburndale, Mass with his son and daughter.

THE appointment of GEORGE N NICKLES as co-ordinator of the Textile Dyestuff Division, Hilton Davis Chemical Co, Cincinnati, was recently announced.

Mr Nickles' duties will consist of integrating the work of the chemical concern's production and sales research departments. He will also coordinate activities between the parent firm and its sales representatives: Hilton-Davis Sales Co, Boston, Mass; Blackman-Uhler Co, Inc, Spartanburg, S C, and The Canadye Corp, Hamilton, Ontario.

Mr Nickles, who was associated with Hilton-Davis from 1949 to 1952, is rejoining the company after serving 18 months with Pacific Mills in Lyman, S C.

LOUIS NEUBERG, Vice President-Sales of the Westvaco Chemical Division of Food Machinery and Chemical Corporation, has been appointed Vice President of the Chemical Divisions of the Corporation.

The Chemical Divisions of Food Machinery and Chemical Corporation include the two newly-formed divisions, Westvaco Chlor-Alkali Division and the Westvaco Mineral Products Division (see page 24) as well as Buffalo Electro-Chemical Company, Inc (Division of FMC), Niagara Chemical Division and the Ohio-Apex Division. Mr Neuberg's office will remain at 161 East 42nd Street, New York 17, where the administrative staff headquarters for the Chemical Divisions are now located.

ROGER ADAMS, head of the Department of Chemistry & Chemical Engineering at the University of Illinois and past president and past chairman of the Board of Directors of the American Chemical Society, has been chosen to receive the 1954 Perkin Medal of the American Section of the Society of Chemical Industry.

F M Meigs

R K Muller

J M Hoerner

NEWS from General Aniline & Film Corporation deals with the following appointments:

FREDERICK M MEIGS has been named assistant general manager of foreign operations, while JOHN H HILLDRING, recently elected senior vice president of GAF, continues as general manager of foreign operations. In his new post, Dr Meigs, formerly director of GAF's Development Department, will assist in the management of all foreign operations of both General Aniline and General Dyestuff Corporation, including the Ozalid and Ansco Divisions of GAF.

FREDERICK A HESSEL has joined GAF's Commercial Development Department as commercial research manager. He will be responsible for market surveys and technical-economic evaluations of new products handled by the department, of which JESSE WERNER is director. Until joining General Aniline, Dr Hessel had been president of the Montclair Research Corporation since 1941.

At Linden, N J, LEON KATZ and HARVEY GURIEN have been named to the Process Development Department staff of the Graselli plant. Both have been assigned to the vat colors section.

THE establishment of a new rosin amine sales and development group and two new assignments for technical salesmen have been announced by Hercules Powder Company's Naval Stores Department.

The rosin amine sales and development group will be under the managership of EMILE PRAGOFF, JR, and will concentrate on the widening of industry applications for this new Hercules chemical family.

CHARLES MOSS is being transferred from the Wilmington technical service group to the New York territory as a technical sales representative. FRED DONAVAN is being transferred from technical sales work in the New York territory to a similar position in the San Francisco office territory.

TOWER IRON WORKS, Providence, R I, has announced the appointment of RICHARD K MULLER to the position of chief engineer. Mr Muller became associated with the firm in 1950 and has served most recently as division engineer in charge of research and development at Tower's Dighton Division Plant. In his new post he will head Tower's Engineering and Estimating Department.

Tower has also added ROBERT C LAWRENCE to their Engineering and Estimating Department as a structural engineer. Mr Lawrence was previously with Tower from 1936-1941. Most recently he served as assistant chief engineer with a New England steel firm.

FREDERICK J STOCK, Vice President, Commercial Development Division, Mathieson Chemical Corporation, has been elected President, New York Board of Trade, Inc, succeeding JAMES P FORDYCE, who has been elected Chairman of the Board.

The election took place at a special luncheon meeting of the Directors held December 10th at the India House and attended by 35 of the Board's Directors.

The three vice presidents are JARVIS CROMWELL, Iselin-Jefferson Company, Inc; BERNARD P DAY, Joseph P Day, Inc, and ROBERT B MAGNUS, Magnus, Mabee & Reynard, Inc.

FRED J EMMERICH, Read & Emmerich, was elected treasurer and PHILIP F SWART, Guaranty Trust Company of New York, assistant treasurer. HERBERT J LYALL, American Airlines, Inc, continues as secretary and EDWIN M OTTERBOURG, New York County Bar Association, was reelected general counsel.

M D GRIFFITH continues as executive vice president.

ROBERT M AUDE has been appointed manager of Heyden Chemical Corporation's Fords, N J, plant. Previously, Mr Aude had been associated with Monsanto Chemical Co since 1939, most recently as general superintendent of their Port Plastics plant in Cincinnati, O.

APPOINTMENT of JOHN M HOERNER to the newly created position of Chemical Division director of purchases and sales was announced recently by Armour and Company, Chicago.

Mr Hoerner was previously associated for 22 years with the Atlantic Refining Company. At Armour, Mr Hoerner will direct raw material purchases and the sale of chemical products including fatty acids and derivatives and industrial oils.

HOOKER ELECTROCHEMICAL COMPANY has announced the following personnel moves:

SAMUEL J NELSON, JOHN E WIER and FRANK W LONG, chemists, have been added to the resins and plastics group of the research and development department. Dr Long comes to Hooker from U S Rubber Co; Mr Wier, from the Organic Plastics Section of the National Bureau of Standards; and Mr Long, from the Minnesota Mining and Manufacturing Co.

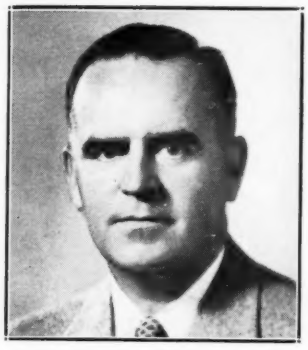
New engineers include JOSEPH J CONSTANTINO, who will work in the field of design, and JACOB B HUFFORD, a chemical engineer assigned to the process study group. Mr Constantino was formerly with Chemstrand Corporation.

JOSEPH E THORNBERG has been made technical sales service field representative and DELMONT J BOUNDY and HENRY R MORRISON have been advanced to positions in the sales-production co-ordination office of the sales department.

DONALD J HANCHETT and EDWIN W SHAND have been named to new posts in the Sales Development Section of the Chemical Division of Koppers Co, Inc.

Mr Hanchett, who has been adhesives product manager in the Section since 1951, now heads the Thermosetting Resins Branch.

Dr Shand, a technical representative in the Section since 1948, now heads the Specialty Chemicals Branch.



R F McClellan

ROBERT F McCLELLAN has been named vice-president and general manager of Yocum Faust Ltd, London, Ont, a subsidiary of Nopco Chemical Co and major Canadian producer of industrial processing chemicals.

Mr McClellan, since 1942, has been midwest district manager for Nopco, with headquarters in Chicago. One of his first duties in the new post will be directing the additions to the Canadian plant, plans for which are now under way.

Joseph Lind

JOSEPH LIND, prominent combustion equipment sales engineer, formerly associated with the Carbomatic Corporation, has opened an office for the Burdett Manufacturing Company of Chicago at 53 Park Place, New York 7, New York. Mr Lind will represent the Burdett Manufacturing Company in sales of combustion systems and complete finishing systems, including ovens, spray booths, washers, etc, in Metropolitan New York, Connecticut and New Jersey.

A Holdsworth

STEIN, HALL & CO, INC, New York, has announced that ARTHUR HOLDSWORTH has joined the Sales Department and will deal in the textile, adhesive, and food fields. Mr Holdsworth has been assigned the company's Providence, R I, branch.

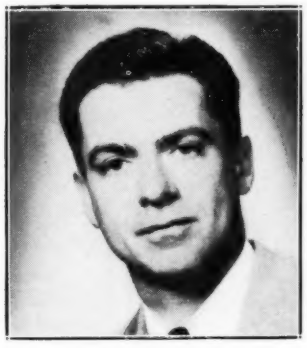
Mr Holdsworth came to Stein, Hall from Bradford Dyeing Association, Bradford, R I, where he was supervisor of the Resinating Department.

A A Halden

A A HALDEN, executive vice president of National Starch Products Inc, recently returned from an extensive European trip.

In addition to inspecting National's adhesive and starch plants in England and Holland, he traveled through France, Germany and Italy, where he had discussions with the producers of chemicals and various natural raw materials regarding the supply and market expectations for 1954.

THOMAS J GILLICK, JR, treasurer of the Western New England Section, AATCC, highlighted the program at the annual Christmas party of the American Felt Company on Dec 17, with a reading of "The Nativity" from St Luke. Unfortunately, NORMAN DAVIS was unable to provide a musical setting for Mr Gillick's reading as originally planned.



G R Campbell

TRIANGLE FINISHING CORP, Johnstown, New York, has made known the appointment of GEORGE R CAMPBELL as general manager. He will be in charge of all plant operations.

For the last six years Mr Campbell has been in charge of throwing, tricot knitting and finishing at the MKM Knitting Mills, Inc.

JC CAVIN has been promoted to assistant superintendent of the dyeing and finishing plant, Riegel Textile Corporation, Trion Division. He has held the position of overseer of packing and shipping since 1948. Mr Cavin fills the vacancy left when PRESTON DAVID was transferred to the Ware Shoals Division of Riegel as managerial assistant.

P M Platzman

PAUL M PLATZMAN, formerly associate editor of *Textile Industries*, is now with John Mather Lupton Co, Inc as manager of the firm's news and feature bureau.

ORGANIC CHEMICAL CORPORATION, Providence, R I, has added WILLIAM H OGDEN to the staff as a sales technician in the New England area. Mr Ogden has had extensive experience in the woollen and worsted trades, having served Watson-Park Company for 26 years as a trouble shooter and demonstrator.

Mr Ogden is the inventor of the Ogden Process (patent applied for), a one-bath stripping and dyeing operation.

R M Moore

B H Kirby

T H Vaughn

AT a recent meeting of the Board of Directors, ROBERT M MOORE was elected vice president—sales of Pittsburgh Coke & Chemical Company. He has been with the company since 1942, having served in the capacity of general manager—sales for the last seven years. In his new post, Mr Moore will be responsible for the general sales activities of the company.

It has also been announced that BEN H KIRBY, formerly with General Aniline & Film Corp, has joined Pittsburgh's Fine Chemicals Division as superintendent of operations. In this capacity he will be responsible for all the production maintenance, quality control, process development and manufacturing activities of the Division. He will assist the Division manager in co-ordinating these activities and harmonizing them with the Division's sales program.

AT A recent Board of Directors meeting of the Colgate-Palmolive Company in Jersey City, N J, THOMAS H VAUGHN was elected vice-president in charge of research and development. Dr Vaughn resigned a similar position at Wyandotte Chemicals Corporation to accept the Colgate-Palmolive post.

E E DREGER continues as vice-president of the company and A L FOX remains as director of the Research Department.

E J Gernt

W C Davis

R T Gibson

EDMUND J GERNT has joined the Chemstrand Corporation's Research and Development Department, where he will be in charge of continuous filament work in the textile research section. He comes to Chemstrand from the Schwarzenbach Huber Company, where he served as general manager of manufacturing and sales.

JOHN F VEACH has been named representative for the Karl H Inderfurth Co, Charlotte, N C. Mr Veach, associated with Frank Ix & Sons for the past 3½ years, will be located in the Charlotte office, where he will handle the complete line of equipment manufactured by various companies and sold in the South through the Inderfurth Company.

W C DAVIS & ASSOCIATES, Atlanta, Ga, has been appointed agent in the Southeast for Rodney Hunt Machine Co's Process Equipment Division. Headed by WALTER C DAVIS, the organization will have complete sales engineering and marketing responsibility for the patented Rodney Hunt Turba-Film Evaporator and the Rodney Hunt-Luwa Spray Dryer, as well as other stainless steel processing equipment.

Mr Davis at various times has been associated with Du Pont, Allied Chemical & Dye, American Machine and Metals, and Sharples Corporation.

THE appointment of WILLIAM ANDERSSON, JR to the technical sales staff of Finetex Incorporated, Pompton Plains, N J, has been confirmed. Mr Andersson recently resigned from Colloids, Inc, where he was an officer and a member of the Board of Directors.

R TIMOTHY GIBSON has been appointed Metropolitan New York sales representative for Ohio Falls, Inc, Louisville, Kentucky. He will maintain offices at 40 Worth Street, New York.

William I Wymond, Ohio Falls' president, points out that the opening of the New York resident sales office is the first of several such offices to be opened throughout the country.

BERTRAND W HAYWARD, director of the Philadelphia Textile Institute, was recently elected president of the National Council of Textile Education. Members of the Council, representing the nation's textile college, met at Wilmington, Delaware, as guests of Du Pont's Textile Fibers Department.

L S Thompson

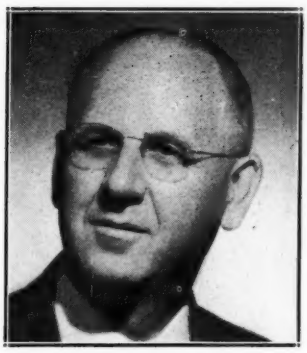
LAWRENCE S THOMPSON has been appointed manager, Dyestuff Technical Department of the General Dyestuff Corporation replacing D E MARNON, who has resigned.

Mr Thompson joined GDC in 1941 as a department head in the dyestuff laboratory and more recently has served as general technical service representative.

F L Maltby

FREDERICK L MALTBY has assumed new duties as technical director in charge of all research, development and design facilities at the Fielden Instrument Division, Robertshaw-Fulton Controls Co, Philadelphia, Pa.

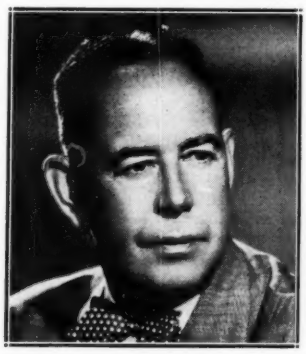
Previous to joining Fielden, Mr Maltby was with the Bristol Company, Waterbury, Conn.



F G Calkin

FRANK G CALKIN has been appointed manager of sales, Organic Chemical Division, Tennessee Corporation, Atlanta, Ga. Mr Calkin's previous associations with suppliers to the textile industry have included Solvay, Virginia Smelting and Oronite.

C W Bendigo



W C Marshall

W F Corbett

KENNETH C TOWE, president of American Cyanamid Company, was elected a board member of the National Industrial Conference Board, New York, at the Board's 343rd meeting recently. The NICB is an independent, nonprofit institution for business and industrial fact-finding.

* * * * *

On December 1, Cyanamid announced the reorganization of its development functions. Under the new organization there will be three departments: the Fiber Development Department, with C W BENDIGO as manager; the Market Research Department with BORDEN R PUTNAM, JR as manager; and the New Product Development Department with NOLAN B SOMMER as manager.

Mr Bendigo will supervise commercial evaluation of experimental textile fibers developed by the company. These so far, have included acrylic fibers all known by the experimental designation "X-51".

Mr Putnam will supervise market surveys to determine the advisability of plant expansions, product diversification and development of new products, as well as long-range studies on development of new raw materials, processes and products.

Dr Sommer will be in charge of the development of markets for new products available from the firm's research laboratories and pilot plants.

* * * * *

From Cyanamid's Calco Chemical Division comes word of the appointment of WILLIAM C MARSHALL as representative of the Division's Dyestuff Department for the Pacific Northwest territory. He will make his headquarters at 935 N W 12th Ave, Portland 9, Oregon, serving all color-consuming industries in Northern California, Oregon and Washington and the paper trade on the entire Pacific Coast.

Since 1936 Mr Marshall has been sales representative for the Pacific Coast Supply Co, Portland, Ore. He is a member of the Pacific Northwest Section, AATCC, having served as treasurer from 1949-1952.

* * * * *

A new branch application laboratory of Cyanamid's Textile Resin Department has opened in Charlotte, N C, under the direction and supervision of WILLIAM F CORBETT. The laboratory, in the Cyanamid company office, is completely equipped to do standard laboratory applications for evaluation. Mr Corbett joined Cyanamid in 1948 as a laboratory technician in the main application laboratory in Bound Brook, N J. In his new post, he will report to R W ANGSTADT, manager of the Charlotte office.

Fred C Scholler celebrates the sixtieth birthday of William Jackson, Jr, a member of the Scholler Bros, Inc, service organization, (here pictured with his wife) at the Hotel Charlotte, Charlotte, N C, to which 60 friends were invited. The party was held on Friday, Dec 4.

THE following officers of the Textile Research Institute were elected at the November meeting of the Board of Trustees:

President——PERCIVAL S HOWE, JR, American Thread Co, Inc

Vice President and Chairman of the Executive Committee —— SYDNEY M CONE, JR, Cone Mills Corp

Treasurer —— DONALD H POWERS, Warner-Hudnut, Inc

Secretary —— PAUL C ALFORD, JR, Textile Research Institute.

New trustees include: ANDRE BLUMENTHAL, Sidney Blumenthal & Co, Inc; HARRY L DALTON, American Viscose Corp; GAYLORD DAVIS, American Enka Corp; L K FITZGERALD, Dan River Mills, Inc; CHARLES S FOWLER, Pepperell Mfg Co; MILTON HARRIS, Harris Research Laboratories; M EARL HEARD, West Point Mfg Co; PERCIVAL S HOWE; W A KARL, Firestone Tire & Rubber Co; RICHARD T KROPF, Belding Heminway Co, Inc; ELSIE MURPHY, S Stroock & Co, Inc; F EVERETT NUTTER, Goodall-Sanford, Inc; EDWARD T PICKARD, The Textile Foundation; W BAILEY SELLARS, Burlington Mills Corp; RUSSELL C SMITH, Cranston Print Works Co; and A M TENNEY, A M Tenney Associates, Inc.

THE appointment of WILLIAM H ERWIN as international division director in Atlas Powder Company's industrial chemicals department has been announced. In his new post, Mr Erwin will be responsible for development of chemical sales and operations outside the United States. He previously headed chemical sales in the company's Wilmington district, in which post he is being succeeded by HARRY B PAUL. HOWARD W DELLARD succeeds Mr Paul as head of the Chicago district chemical sales office.

THE following slate of officers was elected by the Society of Cosmetic Chemists at the annual business meeting on December 10th:

President —— DONALD H POWERS, Warner-Hudnut Co

President-Elect —— KENNETH L RUSSELL, Colgate-Palmolive Co

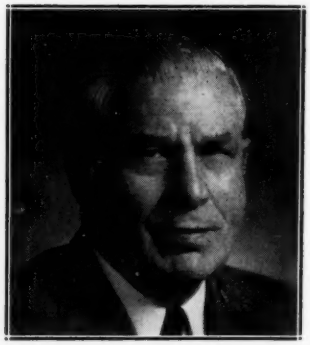
Secretary —— ROBERT A KRAMER, Evans Chemetics Inc

Treasurer —— MOODY L CROWDER, Pond's Extract Co

Directors —— RUTH RUBIEN, *Good Housekeeping*, and THOMAS R FARRELL, *The Drug and Cosmetic Industry*.

The above group of National Starch Products directors and management officials recently visited the company's Indianapolis plant to inspect the numerous improvements being carried out under current expansion plans. Of particular interest was the new "by-products" building, which will shortly be in operation.
(Left to right): Edward Conway, Frank Greenwall, Chester Gage, Evans Woolen, Jr, Bernard Shulist, Herbert Piel, William Schiliges and A A Halden.

OBITUARY



E F Smith

E F Smith

FUNERAL services were held on December 7 for ELMER F SMITH, vice president of American Aniline Products, Inc, in Chicago. He was 63.

Mr Smith, a prominent figure in the Midwest dyestuff industry, was born in Kansas City, Mo, on October 16, 1890. He moved to Chicago in 1907, beginning his career with Sherwin-Williams. He went with National Aniline Division in 1914. When American Aniline Products, Inc opened their Western Branch in 1920, he joined them as manager of the Dry Color Department. He was made Western Manager in 1923 and vice president of the corporation in 1943.

Mr Smith managed the Chicago Convention of the American Association of Textile Chemists in 1947, and served as an advisor during AATCC's most recent Convention. He also served AATCC's Mid-West Section as a Councilor. A past president of the Chicago Drug & Chemical Association, Mr Smith was also a member of the Chicago Perfumery, Soap and Extract Association, a past master for Damascus Lodge #888 in Chicago, a member of the Chicago Athletic Association and the Olympia Fields Country Club.

Surviving are his widow, a son, a daughter and his parents.

H F McKenna

HUGH F McKENNA, who retired in 1950 after 40 years in the dyestuff industry, died on October 15, 1953.

Mr McKenna was born in Woburn, Mass, where he later became alderman. A graduate of Lowell Technological Institute, he moved to Chicago in 1910 to join United Indigo as a chemist. He became their Western manager in 1919, which position he held until the company dissolved in 1919. He was employed by American Aniline Products, Inc as a salesman from 1940 until his retirement.

Mr McKenna is survived by a sister, Mary McKenna, of Woburn.

on De-
H, vice
oducts,

in the
orn in
1890.
inning
s. He
ion in
oducts,
1920,
e Dry
Vestern
ent of

Con-
ion of
ved as
recent
TCC's
A past
emical
ember
ad Ex-
Damas-
ber of
nd the

daugh-

red in
yestuff

oburn,
erman.
al In-
910 to
. He
1919,
com-
ployed
as a
ement.
sister,